CHEMCLENE CORPORATION
CORRECTIVE ACTION
FACILITY REMEDIATION (ENFORCEMENT)
DRAFT 3008(h) AND NEGOTIATIONS/
CORRESPONDENCE

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

APR 0 8 1988

Mr. Lloyd Balderston
Chemclene Corporation
258 North Phoenixville Pike
Malvern, Pennsylvania 19355

Re: Chemclene Corporation
Malvern, Pennsylvania
PAD 014353445

Dear Mr. Balderston:

Ground water monitoring data, provided by the Chemclene Corporation for the former disposal area (FDA) and production plant monitoring wells C-1 through C-5, and soil sampling data from the FDA indicates a release of hazardous waste or hazardous waste constituents from your facility. Therefore, the facility is subject to corrective action authorities under Section 3008(h) of the Resource Conservation and Recovery Act (RCRA), 42 U.S.C. § 6928(h).

Mr. Greg Koltonuk of my staff is currently preparing a corrective action consent order which will be forwarded to you in the near future. In the meantime, I have enclosed a copy of the pertinent sections of the Corrective Action Plan (CAP) for your review. The CAP is a guidance document the Agency uses when developing corrective action orders. Mr. Koltonuk will be contacting you shortly to schedule an initial meeting to discuss the CAP and its application to your facility.

Sincerely,

Neil R. Swanson
Assistant Branch Chief
Hazardous Waste Enforcement Branch

Enclosure
cc: Bruce Smith (3HW10)
[redacted] Koltonuk (3HW11)
Joseph Kotlinski (3HW11)

Bill

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
WASHINGTON, D.C. 20460

JUL 27 19

JUL 2 19

OFFICE OF
SOLID WASTE AND EMERGENCY RESPONSE

EPA - Region III

MEMORANDUM

SUBJECT: Concurrence on Section 3008(h) Corrective Action Order on Consent for Chemclene Corporation; Malvern, Pennsylvania

FROM: Steve Heare, Acting Director
RCRA Enforcement Division, OWPE

TO: Steve R. Wassersug, Director
Hazardous Waste Management Division, Region III

I have reviewed the July 13, 1988 draft of the above referenced Order and I concur on its issuance. Congratulations to you and your staff for the successful development and negotiation of this order.

AR000002

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

AUG 0 1 1988

Mr. Lloyd Balderston
Chemclene Corporation
258 North Phoenixville Pike
Malvern, Pennsylvania 19355

Re: § 3008(h) RCRA Corrective Action Order

Dear Mr. Balderston:

Enclosed is the Resource Conservation and Recovery Act (RCRA) Corrective Action Consent Order for Chemclene Corporation. As discussed during our meeting May 17, 1988, we are requesting that you sign this Consent Order within sixty (60) calendar days of your receipt. Failure to sign the Consent Order may result in the pursuit of an unilateral enforcement action by the U.S. Environmental Protection Agency (EPA) to resolve this matter. EPA-Region III is committed to enforcing the provisions of RCRA and to protecting the public health and the environment. We are also committed to working with the regulated community to achieve these goals. To that end, we remain available to meet and discuss with you this Consent Order and associated issues.

If you have any questions or would like to arrange a meeting, please contact Mr. William Walsh, of my staff, at 215-597-1192. Thank you for your cooperation in this matter.

Sincerely,

for Bruce P. Smith, Chief
Hazardous Waste Enforcement Branch

Enclosure

cc: Joe Kotlinski (3HW11)
Bill Walsh (3HW11)
Neil Swanson (3HW10)
Bill Early (3RC22)
Cecil Rodrigues (3RC22)
Leon Kuchinski (PADER)

● **SENDER:** Complete items 1, 2, 3 and 4.

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1. ☐ Show to whom, date and address of delivery.
2. ☐ Restricted Delivery.

3. Article Addressed to:

Mr. Lloyd Balder[illegible]
Chemclene Corporation
258 North Phoenixville Pike
Malvern, PA 1935[illegible]

4. Type of Service:

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☒ Certified ☐ COD
☐ Express Mail

Article Number [illegible]

Always obtain signature of addressee or agent and DATE DELIVERED.

5. Signature – Addressee
X

6. Signature – Agent
X Lloyd Balderston

7. Date of Delivery
8-2-8[illegible]

8. Addressee's Address (ONLY if requested and fee paid)
[illegible]

PS Form 3811, July 1983 447-845

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UNITED STATES

ENVIRONMENTAL PROTECTION AGENCY

REGION III

IN THE MATTER OF:	)	
	)	ADMINISTRATIVE ORDER ON CONSENT
Chemclene Corporation	)	
Malvern, Pennsylvania	)	U.S. EPA Docket No.
PAD 01 435 3445	)	RCRA-III-010-CA
	)	
RESPONDENT.	)	
	)	
	)	Proceeding under Section
	)	3008(h) of the Resource
	)	Conservation and Recovery
	)	Act, as amended, 42 U.S.C.
	)	§ 6928(h).

I. JURISDICTION

This Administrative Order on Consent ("Consent Order" or "Order") is issued pursuant to the authority vested in the Administrator of the United States Environmental Protection Agency ("EPA") by Section 3008(h) of the Solid Waste Disposal Act, commonly referred to as the Resource Conservation and Recovery Act of 1976, as amended by the Hazardous and Solid Waste Amendments of 1984, 42 U.S.C. § 6928(h) ("RCRA"). The authority vested in the Administrator has been delegated to the Regional Administrators by EPA Delegation Nos. 8-31 and 8-32 dated March 6, 1986.

On January 30, 1986, the EPA granted the Commonwealth of Pennsylvania (the "State") final authorization to operate a hazardous waste program under RCRA Subtitle C, in lieu of EPA, pursuant to Section 3006 of RCRA, 42 U.S.C. § 6926. The State, however, has not been authorized to enforce RCRA § 3008(h).

This Consent Order is issued to the Chemclene Corporation ("Chemclene" or "Respondent"), the owner/operator of a hazardous waste management facility located at 258 North Phoenixville Pike, East Whiteland Township, Malvern Pa. 19355 ("Facility"). Respondent consents to and agrees not to contest EPA's jurisdiction to issue this Consent Order and to enforce its terms. Further, Respondent will not contest EPA's jurisdiction to: compel compliance with this Order in any subsequent enforcement proceedings, either administrative or judicial; require Respondent's full or interim compliance with the terms of this Consent Order; or impose sanctions for violations of this Consent Order.

II. PARTIES BOUND

1. This Consent Order shall apply to and be binding upon Respondent and its officers, directors, employees, agents, successors and assigns, and upon all persons, independent contractors, contractors, and consultants acting under or for Respondent.

2. No change in ownership or corporate or partnership status relating to the Facility will in any way alter Respondent's responsibility under this Consent Order.

3. Respondent shall provide a copy of this Consent Order to all contractors, subcontractors, laboratories, and consultants retained to conduct or monitor any portion of the work performed pursuant to this Consent Order within one (1) week of the effective date of this Consent Order or date of such retention, and shall condition all such contracts on compliance with the terms of this Consent Order.

4. Respondent shall give notice of this Consent Order to any successor in interest prior to transfer of ownership or operation of the Facility and shall notify EPA at least thirty (30) days prior to such transfer.

III. STATEMENT OF PURPOSE

In entering into this Consent Order, the mutual objectives of EPA and the Chemclene Corporation are: (1) to perform a RCRA Facility Investigation (RFI) to determine fully the nature and extent of any releases of hazardous wastes or hazardous constituents at or from the Facility and (2) to perform a Corrective Measure Study (CMS) to identify and evaluate alternatives for the corrective action necessary to prevent or mitigate any migration or releases of hazardous wastes or hazardous constituents at or from the Facility.

IV. FINDINGS OF FACT

1. Respondent is a corporation doing business in the Commonwealth of Pennsylvania and is a person as defined in Section 1004(15) of RCRA, 42 U.S.C. § 6903(15).

2. Respondent owns and operates a solvent distribution and recycling plant on an approximately one hundred (100) acre plot located at 258 North Phoenixville Pike, East Whiteland Township, Malvern, Chester County, Pennsylvania 19355. Respondent's plant is a hazardous waste management facility and has been assigned RCRA identification number PAD 01 435 3445. Respondent also owns two solid waste management units (SWMUs) at the Facility. The SWMUs consist of two unlined earthen pits, each measuring approximately 30'x 50'x 15' deep, located along Bacton Hill, approximately one-quarter mile southwest from Respondent's Facility on land owned by Respondent. The pits are also identified as the former disposal area ("FDA") in a May 28, 1986 report of a study performed by a contractor (Earth Data, Inc.) for the Respondent for purposes of this Consent Order the term "Facility" or "site" refers to both the solvent distribution and recycling plant and the FDA. The plant area is located on the northern area of the Facility (See Attachment 1).

3. Pursuant to Section 3010 of RCRA, 42 U.S.C. § 6930, Respondent submitted to EPA a Notification of Hazardous Waste Activity ("Notification") for its Facility on August 18, 1980. In that Notification, Respondent identified itself as a generator and treater of hazardous waste and an owner/operator of a hazardous waste storage facility.

4. On November 18, 1980, Respondent submitted to EPA a Part A hazardous waste permit application ("Part A") for its Facility pursuant to Section 3005 of RCRA, 42 U.S.C. § 6925, and 40 C.F.R. § 270.10(e). In the Part A, Respondent identified itself as handling among others the following hazardous wastes at the Facility:

(a) Hazardous wastes from non-specific sources listed at 40 C.F.R. § 261.31, (F001 and F002); and

(b) Commercial chemical products, manufacturing chemical intermediates, off-specification commercial chemical products, or manufacturing chemical intermediates identified at 40 C.F.R. § 261.33(f), (U080, U210, U226, and U228).

5. In its Part A, Respondent also stated that it is a distributor of the virgin chlorinated solvents, trichloroethylene (TCE), tetrachloroethylene (PCE), 1,1,1-trichloroethane (TCA) and methylene chloride; a recycler of the above-listed waste chlorinated solvents and Freon and a distributor of vapor degreasing equipment. Recycling is accomplished by simple distillation.

6. Respondent owned and/or operated its Facility as a hazardous waste management facility on and after November 19, 1980. The Facility is an "existing hazardous waste management facility" as defined in 40 C.F.R § 260.10 and qualified for interim status as defined in Section 3005(e) of RCRA, 42 U.S.C. § 6925(e). EPA acknowledged the Facility's qualifying for interim status in a letter to Respondent dated July 20, 1981. Respondent is subject to the interim status requirements contained in Sections 3004 and 3005 of RCRA, 42 U.S.C. §§ 6924 and 6925.

7. Letters submitted to EPA by Respondent on May 22, 1981 and October 23, 1981 stated that in addition to the hazardous wastes listed in paragraph #5 above, Respondent handled the following hazardous wastes at its Facility: U220, U154, U002, U159, U031, U112, K062, U019, U044, U140, U239. (40 C.F.R. §§ 261.32 and 261.33)

8. In its November 18, 1980 Part A, Respondent stated that it was engaged in the treatment and storage of hazardous waste at the Facility by means of the following processes: (A map of the Facility is attached hereto (Attachment 2) which identifies the storage and treatment areas at the Facility.)

(a) containers, used for the storage of F001, F002, K062, U220, U154, U002, U159, U031, U112, U019, U044, U140, U161, U239;

(b) tanks, used for the storage of F001 and F002;

(c) two distillation columns, used for the reclamation of the chlorinated solvents (TCE, PCE, and TCA) from F001 and F002 wastes;

(d) tanks, including one rail tank storage car, used for the storage of F001 and F002 still bottoms resulting from the reclamation process cited in paragraph #8(c) above;

(e) a drum loading pad, used for storage of drums containing hazardous wastes for greater than ninety (90) days; and

(f) a hazardous waste drum loading pad, used for transportation to licensed hazardous waste disposal plants.

9. In addition to the hazardous waste management units listed in paragraph #8, the Respondent owns the two SWMUs in the FDA. These unlined earthen pits were used between 1952

and 1976 for the disposal of drums containing various organic compounds, including PCE, TCE, and TCA from the Respondent's recycling and reclaiming operations. Some of these drums were open and some of the drums were leaking and/or badly damaged when placed in the pits.

10. In 1980, five ground water monitoring wells were installed at Respondent's Facility on a voluntary basis. The wells were installed for the purpose of determining the degree of ground water contamination. Three wells were installed at the Facility and identified as #CC-1, #CC-2, and #CC-3. Two wells were installed at the FDA and identified as #CC-4 and #CC-5.

11. On May 7, 1981, Respondent collected replicate samples from the plant area monitoring wells #CC-2 and #CC-3 and FDA monitoring well #CC-5, which revealed the presence of the hazardous wastes or hazardous constituents TCE, PCE, and TCA in the ground water underlying both the plant area and the FDA. A replicate sample is a prescribed volume that is collected and divided into three (3) portions; an analysis is then performed on each portion. Analytical results for these samples are listed below in Table 1.

TABLE 1

Plant Area and FDA Sample Results

Monitoring Well	TCA (ppb)	TCE (ppb)	PCE (ppb)
CC-2	12.4	57.8	7.3
	13.3	62.2	7.0
	17.0	64.1	3.0
CC-3	2,080.	12,600.	1,120.
	2,230.	12,600.	1,170.
	1,690.	10,500.	885.
CC-5	586.	1,180.	861.
	627.	1,310.	904.
	572.	1,270.	743.

12. On April 8, 1982, EPA contractors (Ecology and Environment, Inc.) conducted a site inspection and collected samples at the FDA. Analytical results of these samples indicated the presence of TCE, PCE, and TCA in the soil, in standing water, and in drums at the FDA. Additionally, on May 8 and 9, 1980 and June 13, 1980, Respondent voluntarily collected samples from 44 residential wells in the vicinity of the Facility and

analyzed for TCE. During that time, PADER also collected and analyzed several samples at wells #36, #48, and #55. Attachment 3 shows the locations of the wells sampled on May 8 and 9, 1980 and June 13, 1980. Tables 2 and 3 below present these data.

TABLE 2

Ecology and Environment, Inc. April 8, 1982 Sampling Results

Sample	TCE (ppb)	PCE (ppb)	TCA(ppb)
Stained Soil #1	6,500	12,000	2,900
Standing Water	1,700	22,000	820
Stained Soil #2	28	570	20
Drum Sample	13,000	1,300	---

TABLE 3

Chemclene and PADER May 8,9 and June 13, 1980 Sampling Results

TCE Concentrations (ppb)

Well No.	Concentration	Well No.	Concentration	Well No.	Concentration
1	0.0	25	0.0	54	0.0
2	0.0	35	1.2	55	0.0 (PADER)
3	0.0	36	2.6 (PADER)	56	14.3
4	0.0	41	190.5	57	11.4
5	2.5	42	0.0	58	2.9
6	32.4	43	0.0	59	0.0
7	0.0	44	0.5	60	0.0
8	0.0	45	0.0	61	0.0
9	75.6	46	0.0	63	0.0
10	1330.0	47	0.0	64	0.0
15	27.0	48	0.0 (PADER)	65	0.12
16	8.8	49	0.0	67	0.40
17	15.0	50	0.0		
19	13.3	51	0.5		
20	0.3	52	0.0		
23	13.0	53	0.0		

13. On August 3, 1984, soil samples taken by PADER and Respondent revealed the presence of TCE, PCE, and TCA in the soil at the FDA. Analytical results associated with those samples are shown below in Tables 4 and 4a.

TABLE 4

PADER ANALYTICAL RESULTS (ppb)

Sample Description	TCE	TCA	PCE
At FDA - 6" below base of open pit	7,760	18,090	140,250
At FDA - 1 foot below base of open pit	2,890	9,520	74,380
At FDA - 2 feet below base of open pit	260	950	1,110
At FDA - 3 feet below base of open pit	790	2,810	3,200
At FDA - 4 feet below base of open pit	770	2,400	8,500
At FDA - 5 feet below base of open pit	4,250	19,440	3,050
At FDA - 6 feet below base of open pit	35,550	119,180	912,780
At FDA - 7 feet below base of open pit	9,800	27,850	90,940

TABLE 4a

Chemclene Analytical Results for TCE (ppb)

Sample Description	Concentration
At FDA - open pit surface sample	8,100
At FDA 6" below base of open pit	1,100

Sample Description	Concentration
At FDA 1 foot below base of open pit	4,800
At FDA 2 feet below base of open pit	3,100
At FDA 4 feet below base of open pit	7,900
At FDA 6 feet below base of open pit	4,500
At FDA 7 feet below base of open pit	13,300

14. After discussions with the Pennsylvania Department of Environmental Resources (PADER), Respondent performed a voluntary cleanup of the FDA. From 1981 to 1984, Respondent removed the waste drums containing the hazardous wastes and hazardous constituents listed in Paragraphs #4, #5, and #7 and sent them to Fondessy Landfill in Ohio for disposal. Respondent also excavated the contaminated soils in the FDA to a depth of approximately 15 feet. This was completed in 1985. The excavated soils were also sent to the Fondessy Landfill for disposal. Fondessy Landfill is a RCRA permitted disposal facility.

15. In addition to the first area of ground water contamination which is located at the FDA, a Groundwater Quality Investigation report prepared for Respondent by Earth Data, Inc. in March 1982, stated that a second potential area of ground water contamination is located in the production plant area. This potential area of contamination is mentioned in an October 26, 1984 letter from PADER to Respondent. PADER and Respondent believe the ground water contamination in the production plant area is caused by past poor container management and spillages of those hazardous wastes and/or hazardous constituents identified in paragraphs #4, #5, and #7. The source of the ground water contamination beneath the plant area was also corroborated by Respondent during EPA's inspection of the facility on September 18, 1987.

16. During the summer of 1984, Respondent voluntarily installed a spray irrigation system to treat contaminated ground water from plant area well #CC-3. [The other two plant area wells, #CC-1 and #CC-2, were not used for pumping water because #CC-1 had collapsed sometime after construction and #CC-2 did not produce an adequate yield.] The spray irrigation system consisted of the following: a pump at well #CC-3, which conducts water from well #CC-3 through piping up a vertical wall of the

building which houses the solvent distillation/recovery operations and then to the roof; a horizontal pipe on the roof connecting the pipe from the vertical wall to a series of vertical pipes each with a spray nozzle at the end. Water was pumped from well #CC-3 through this piping arrangement and out of the nozzles onto the flat roof of the building. When the TCE, TCA, and PCE contaminated water exited the nozzles, the contaminants would volatilize or evaporate from the water. Excess water from the roof was directed to gutters and then onto the ground surface.

17. On August 16, 1984, Respondent submitted a report to PADER which included analytical results of samples taken from plant area well #CC-3 during a one-week test of Respondent's spray irrigation system (August 4 thru August 9, 1984). These results revealed the ground water was contaminated by TCE, PCE, and TCA. The report contained sampling results of this contaminated ground water after spray irrigation treatment. Samples of the ground water prior to treatment were taken at a valve in the piping system, while samples of the treated ground water were collected at the edge of the roof of the solvent distillation/recovery building. The analytical data for these tests are listed in Table 5 below.

TABLE 5

Before Treatment			After Treatment		
TCA (ppb)	TCE (ppb)	PCE (ppb)	TCA (ppb)	TCE (ppb)	PCE (ppb)
24,228	15,518	914	12.5	5.1	<1.0
24,527	14,656	1,917	10.1	1.9	<1.0
22,459	13,741	1,787	7.0	1.9	1.0
10,974	14,285	2,444	12.2	10.3	1.4
19,802	12,545	2,091	12.5	6.6	1.6

18. After January, 1985 the spray irrigation system was abandoned because ground water exiting the nozzles, would freeze as it fell on the roof of the building and the subsequent ice buildup threatened to cause the roof to collapse.

19. Respondent submitted a report on March 22, 1985 to PADER for samples taken from plant area well #CC-3 during the period November 28, 1984 to January 8, 1985. These samples continued to demonstrate that the ground water was contaminated with TCE, PCE, and TCA. This report also contained the sampling results for the contaminated ground water after it was treated by Respondent's spray irrigation system. The sampling results are listed in Table 6 below.

TABLE 6

Samples Taken From Spray Irrigation System

	Before Treatment			After Treatment		
Date	TCA (ppb)	TCE (ppb)	PCE (ppb)	TCA (ppb)	TCE (ppb)	PCE (ppb)
11/28/84	7,252	6,345	665	10.3	3.5	<1.0
12/05/84	6,020	3,577	283	31.2	33.6	2.1
12/11/84	6,103	3,706	159	15.4	4.5	4.0
12/18/84	6,633	4,353	258	11.3	1.3	<1.0
12/31/84	6,540	4,228	186	19.5	8.6	<1.0
01/08/85	6,490	4,180	173	23.5	10.9	1.4

20. Ground water movement in the bedrock under much of Respondent's Facility is toward the northeast, parallel to major faults. A geologic map of the area indicates the presence of two major faults trending in a southwest to northeast direction across the Facility. The ground water discharge points (or sinks) for this subsurface flow system are the deep quarries operated by the Martin-Marietta Corporation and the Warner Company in Devault, PA, which is north of the Facility. Large amounts of ground water are pumped from these quarries for dewatering purposes and large cones of influence radiate away from them. Residential developments, the Great Valley Senior High School and industrial parks are located in the immediate vicinity of the Facility and could be affected by the ground water contamination emanating from the Facility.

21. The FDA is underlain by the Ledger Formation, a light gray dolomite. Upslope from the Facility and to the north, the area is underlain by the much more resistant quartzite and quartz schist of the Chickies Formation. The resistant rock

underlies most of the ridge of Bacton Hill. A fault contact separates the Chickies and Ledger Formations. The overburden thickness (i.e., unconsolidated materials) in the area varies from a few feet near bedrock exposures to depths estimated up to 150 feet at the centers of incipient sinkholes. Overburden materials consist mostly of clay and silt with some residual rock fragments and sand lenses. Major avenues of ground water flow consist of either bedrock fractures or solution cavities in dolomite; and any plume of contaminants emanating from the Facility would follow in a direction similar to that of the direction of ground water flow.

22. The substances listed in paragraphs #8, #9, #11, #12, #13, #16, #17, and #19 above are hazardous wastes and/or hazardous constituents as defined by Sections 1004(5) and 3001 of RCRA, 42 U.S.C. §§ 6903(5) and 6921, and 40 C.F.R. Part 261. These substances have the following characteristics:

a. Trichloroethylene (TCE) is carcinogenic to mice after oral administration, producing hepatocellular carcinomas (National Cancer Institute 1976, National Toxicology Program 1982). TCE is also a suspected carcinogen for humans. The EPA MCL (Maximum Contaminant Level) for TCE is 5 parts per billion (ppb).

b. Tetrachloroethylene (PCE) induced liver tumors when administered orally to mice and was found to be mutagenic using a microbial assay system. PCE is also a suspected human carcinogen. There is no MCL for PCE; however there is an EPA CAG (Carcinogen Assessment Group) risk level for PCE. For PCE the risk level is 670 ppb.

c. Preliminary results suggest that 1,1,1-Trichloroethane (TCA) induces liver tumors in female mice. It was shown to be mutagenic using the Ames assay (a standard toxicological test), and it causes transformation in cultured rat embryo cells. 1,1,1-Trichloroethane is also a suspected human carcinogen. The EPA MCL for TCA is 200 ppb.

Based on the release of hazardous wastes and/or hazardous constituents into the environment from Respondent's Facility and the human health and environmental concerns at and in the vicinity of the Facility, the Regional Administrator, EPA Region III has determined that the actions ordered below are necessary to protect human health and/or the environment.

V. CONCLUSIONS OF LAW AND DETERMINATIONS

Based on the Findings of Fact set out above, and after consideration of the Administrative Record, the Regional Administrator EPA Region III, has made the following conclusions of law and determinations:

1. Respondent is a "person" within the meaning of Section 1004(15) of RCRA, 42 U.S.C. § 6903(15);

2. Respondent owns and operates a facility that is authorized to operate pursuant to Section 3005(e) of RCRA, 42 U.S.C. § 6925(e).

3. Certain wastes and constituents thereof found at the Facility are hazardous wastes or hazardous constituents thereof as defined by Section 1004(5) of RCRA, 42 U.S.C. § 6903(5). These are also hazardous wastes or hazardous constituents within the meaning of Section 3001 of RCRA, 42 U.S.C. § 6921 and 40 C.F.R. Part 261.

4. There is or has been a release of hazardous wastes and/or hazardous constituents into the environment from the Respondent's Facility.

5. The actions required by this Consent Order are necessary to protect human health and/or the environment.

VI. WORK TO BE PERFORMED

EPA acknowledges that Respondent may have completed some of the tasks required by this Consent Order and that Respondent may have available some of the information and data required by this Consent Order. This previous work may be used to meet the requirements of this Consent Order, upon submission to and formal approval by EPA.

Pursuant to Section 3008(h) of RCRA, 42 U.S.C. § 6928(h), Respondent agrees to and is hereby ordered to perform the following acts in the manner and by the dates specified herein. All work undertaken pursuant to this Consent Order shall be performed in a manner consistent with, at a minimum: the attached Scope of Work for a RCRA Facility Investigation set forth in Attachment 4 to this Order which is incorporated by reference as if fully set forth herein; the Scope of Work for a Corrective Measures Study set forth in Attachment 5 to this Order which is incorporated in by reference as if fully set forth herein; RCRA and its implementing regulations; and applicable EPA guidance documents. Relevant guidance may include, but is not limited to, the RCRA, Facility Investigation (RFI) Guidance" (EPA 530/SW-87-001), "RCRA Ground Water Monitoring Technical Enforcement Guidance Document" (OSWER Directive 9950.1, September 1986), "Test Methods For Evaluating Solid Waste" (SW-846, November 1986) and "Construction Quality Assurance for Hazardous Waste Land Disposal Facilities" (EPA 530/SW-85-031, July 1986) and "OWRS Guidance for Preparation of QA Project Plans" (QWRS-QA-1, May 1984).

Respondent's consent to the entry of this Consent Order shall not constitute or be deemed an admission by Respondent of any fact or conclusion of law made by EPA, or an admission of any fault or liability of Respondent, or an admission of any violation of any laws, rules, or regulations by Respondent, or an admission that the circumstances to be investigated hereunder represent any threat to human health or the environment or to any private or public interests. This Consent Order shall not be admissible as evidence in any court or administrative proceeding, except as evidence for purposes of enforcing this Consent Order.

RCRA FACILITY INVESTIGATION (RFI)

1. Within sixty (60) calendar days of the effective date of this Consent Order, Respondent shall submit a Description of the Current Conditions at the Facility. This Description shall be performed in a manner consistent with the RFI Scope of Work contained in Attachment C. Attachment C to this Consent Order is incorporated by reference as if fully set forth herein. The RFI Workplan shall be developed in accordance with, at a minimum, RCRA, its implementing regulations, and relevant EPA guidance documents.

2. Within 60 calendar days of the effective date of this Consent Order, Respondent shall submit to EPA for approval a Pre-Investigation Evaluation of Corrective Measure Technologies. This Evaluation shall be performed in a manner consistent with the RFI Scope of Work contained in Attachment C.

3. Within 60 calendar days of the effective date of this Consent Order, Respondent shall submit to EPA a Draft Workplan for a RCRA Facility Investigation ("RFI Workplan"). The RFI Workplan is subject to approval by EPA and shall be developed in accordance with, at a minimum, RCRA, its implementing regulations, and relevant EPA guidance documents. Relevant EPA guidance documents include, but are not limited to the Interim Final Corrective Action Plan (OSWER Directive #9902, November 14, 1986) which is appended hereto an Attachment 4 and incorporated herein by reference. Respondent shall conduct the RFI in accordance with the approved RFI Workplan.

4. The RFI Workplan shall be designed to define the presence, magnitude, extent, direction, and rate of movement of any hazardous wastes or hazardous constituents within and beyond the Facility boundary. The RFI Workplan shall document the procedures the Respondent shall use to conduct those investigations necessary to: (1) characterize the potential pathways of contaminant migration; (2) characterize the source(s) of contamination; (3) define the degree and extent of contamination; (4) identify actual or potential receptors;

and (5) support the development of alternatives from which a corrective measure will be selected by EPA. A specific schedule for implementation of all activities shall be included in the RFI Workplan.

5. In accordance with the provisions of Attachment 4 herein, the RFI Workplan shall include: (1) a Project Management Plan; (2) a Data Collection Quality Assurance Plan; (3) a Data Management Plan; (4) a Health and Safety Plan; and (5) a Public Involvement Plan.

6. EPA will review Respondent's Draft RFI Workplan and within 60 calendar days of receipt of such document, will notify Respondent in writing of EPA's approval or disapproval of such document or any part thereof. In the event of EPA's disapproval, EPA shall specify in writing any deficiencies in the Draft RFI Workplan. Such disapproval shall not be subject to the dispute resolution procedures of Section XV, below. In the event that EPA requires more than 60 calendar days to complete its review of the Draft RFI Workplan, EPA will notify Respondent in writing on or before the expiration of the 60 day review period, stating the reason(s) for the delay and the anticipated date for the completion of EPA's review. EPA's inability to complete its review within the 60 day period, however, shall not be construed as either a waiver of EPA review or an approval of Respondent's Draft RFI Workplan.

7. Within twenty-one (21) calendar days of receipt of EPA's comments on the Draft RFI Workplan, Respondent shall submit to EPA for approval a Final RFI Workplan which responds to and/or remedies any deficiencies identified by EPA. In the event that EPA disapproves of the Final RFI Workplan, Respondent may invoke the dispute resolution procedures of Section XV, below. Moreover, EPA reserves the right to prepare the Final RFI Workplan in lieu of Respondent and to seek to recover from Respondent the costs thereof.

8. Upon receipt of EPA approval of the RFI Workplan, Respondent shall implement the EPA-approved RFI Workplan in accordance with the schedule contained therein.

CORRECTIVE MEASURES STUDY (CMS)

9. Within 60 calendar days of receipt of EPA approval of the RCRA Facility Investigation final report, the Respondent shall submit to EPA for approval a Draft Corrective Measure Study in accordance with the CMS Scope of Work in Attachment 5. Attachment 5 to this Consent Order is incorporated by reference as if fully set forth herein.

10. EPA will review Respondent's Draft Corrective Measure Study and within 60 calendar days of receipt of such document, will notify Respondent in writing of EPA's approval or disapproval of such document or any part thereof. In the event of EPA's disapproval, EPA shall specify in writing any deficiencies in the Draft CMS Report. Such disapproval shall not be subject to the dispute resolution procedures of Section XV, below. In the event that EPA requires more than 60 calendar days to complete its review of the Draft CMS Report, EPA will notify Respondent in writing on or before the expiration of the 60 day review period, stating the reason(s) for the delay and the anticipated date for the completion of EPA's review. EPA's inability to complete its review within the 60 day period, however, shall not be construed as either a waiver of EPA review or an approval of Respondent's Draft CMS Report.

11. Within twenty-one (21) calendar days of receipt of EPA's comments on the Draft CMS Report, Respondent shall submit to EPA for approval a Final CMS Report which responds to and/or remedies any deficiencies identified by EPA. In the event that EPA disapproves of the Final CMS Report, Respondent may invoke the dispute resolution procedures of Section XV, below. Moreover, EPA reserves the right to prepare the Final CMS Report in lieu of Respondent and to seek to recover from Respondent the costs thereof.

PUBLIC COMMENT AND PARTICIPATION

12. Upon approval by EPA of a Corrective Measure Study Final Report, EPA shall make both the RCRA Facility Investigation Final Report (or summary of report) and the Corrective Measure Study Final Report (or summary of report) and a summary of EPA's proposed corrective measure and EPA's justification for proposing selection of that corrective measure available to the public for review and comment for at least 21 days.

13. Following the public review and comment period, EPA shall notify Respondent of the corrective measure selected by EPA. If the corrective measure recommended in the Corrective Measure Study Final Report is not the corrective measure selected by EPA after consideration of public comments, EPA shall inform Respondent in writing of the reasons for such decision, and the Respondent shall modify the RFI/CMS Final Reports pursuant to EPA direction by adding or incorporating EPA's decision.

CORRECTIVE MEASURES IMPLEMENTATION (CMI)

14. If Respondent has complied with the terms of this Order, EPA shall provide a 60 calendar day period for negotiation of an administrative order on consent (or a judicial consent decree) for implementation of the selected corrective measure. The 60 calendar day negotiation period shall begin on the date Respondent receives EPA's notification of the selected final corrective measure(s). If agreement is not reached during this period, EPA reserves all rights it has to implement the corrective measure or other remedial response and to take any other appropriate actions under RCRA, Comprehensive Environmental Response, Compensation, and Liability Act of 1980, 42 U.S.C. § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986, Pub. L. No. 99-499, 100 Stat. 1631 (1986) ("CERCLA"), or any other available legal authority, including issuance of a unilateral administrative order directing Respondent to implement the corrective measure.

SUBMISSIONS/AGENCY APPROVAL/ADDITIONAL WORK

15. Within fifteen (15) calendar days of approval or modification by EPA of any Workplan or Program Plan or final report, Respondent shall commence work and implement the tasks required by the Workplan or Program Plan submitted pursuant to the Scope(s) of Work contained in Attachments 4 and 5 in accordance with the standards, specifications, and schedule stated in the Workplan or Program Plan as approved or modified by EPA.

16. Beginning with the second month following the effective date of this Consent Order and continuing throughout the period this Order is effective, Respondent shall provide EPA with bimonthly progress reports which shall be submitted by the tenth day of the following month. The progress reports shall conform to requirements in relevant Scope(s) of Work contained in Attachments 4 and 5.

17. Respondent shall provide draft and final RCRA Facility Investigation and Corrective Measure Study reports to EPA in accordance with the schedule contained in this Consent Order and its attachments.

18. EPA will review all draft or final reports, and notify Respondent in writing of EPA's approval/disapproval or modification of the report or any part thereof. In the event of any disapproval, EPA shall specify in writing the deficiencies and reasons for such disapproval. Within the specified period of receipt of EPA's disapproval of any report, Respondent shall amend and submit a revised report

which responds and/or remedies deficiencies identified by EPA. EPA approved reports shall be deemed incorporated into and part of this Consent Order.

19. Four copies of all documents, including Workplan(s), Program Plan(s), preliminary and final reports, progress reports, and other correspondence to be submitted pursuant to this Consent Order shall be hand delivered or sent by certified mail, return receipt requested, to the Project Coordinator designated pursuant to Section XII, "PROJECT COORDINATOR," below.

20. All work performed pursuant to this Consent Order shall be under the direction and supervision of a professional engineer or geologist with expertise in hazardous waste site cleanup. On or before the effective date of this Consent Order, Respondent shall submit to EPA for approval of the name, title, and qualifications of the engineer or geologist, and of any contractors or subcontractors and their personnel to be used in carrying out the terms of this Consent Order. Respondent may replace any professional engineer or geologist retained to supervise work performed pursuant to this Order subject to receiving prior approval from EPA.

21. EPA may determine that certain tasks and deliverables, including investigatory work or engineering evaluation, require additional work. These tasks and deliverables may or may not have been in the Workplans. EPA shall request, in writing, that Respondent perform the additional work in this situation and shall specify the basis and reasons for EPA's determination that the additional work is necessary. Within 15 calendar days after the receipt of such request, Respondent shall have the opportunity to meet with EPA to discuss the additional work EPA has requested. In the event that Respondent agrees to perform the additional work, such work shall be performed in a manner consistent with this Consent Order. EPA, however, reserves the right to order Respondent to perform such additional work; to perform such additional work itself, and to seek to recover from Respondent all costs of performing such additional work; and to disapprove of the RFI Workplan and/or CMS Report in the event that Respondent does not perform such additional work.

VII. QUALITY ASSURANCE

Throughout all sample collection and analysis activities, Respondent shall use EPA-approved quality assurance, quality control (QA/QC), and chain-of-custody procedures as specified in the approved Workplans. In addition, Respondent shall:

1. Ensure that laboratories used by Respondent for analyses perform such analyses according to the EPA methods included in "Test Methods for Evaluating Solid Waste (SW-846, November 1986) or other methods deemed satisfactory to EPA. If methods other than EPA methods are to be used, Respondent shall submit all protocols to be used for analyses to EPA for approval at least 30 calendar days prior to the commencement of analyses.

2. Ensure that laboratories used by Respondent for analyses participate in a quality assurance/quality control program equivalent to that which is followed by EPA. As part of such a program, and upon request by EPA, such laboratories shall perform analyses of samples provided by EPA to demonstrate the quality of the analytical data.

VIII. PUBLIC REVIEW OF ADMINISTRATIVE RECORD

1. The Administrative Record supporting the issuance of this Consent Order will be available for public review during normal business hours by contacting William Walsh at:

U.S. Environmental Protection Agency
Region III
841 Chestnut Building
Philadelphia, PA 19107
(215) 597-1192

IX. ON-SITE AND OFF-SITE ACCESS

1. EPA and/or any EPA representative are authorized to enter and freely move about all property at the Facility during the effective dates of this Consent Order for the purposes of, inter alia: interviewing Facility personnel and contractors; inspecting records, operating logs, and contracts related to the Facility; reviewing the progress of the Respondent in carrying out the terms of this Consent Order; conducting such tests, sampling or monitoring as EPA or its Project Coordinator deem necessary; using a camera, sound recording, or other documentary type equipment; and verifying the reports and data submitted to EPA by the Respondent. The Respondent shall permit such persons to inspect and copy all records, files, photographs, documents, and other writings, including all sampling and monitoring data, that pertain to work undertaken pursuant to this Consent Order. While at the Facility EPA, the Respondent, and their respective representatives shall comply with all approved health and safety plans.

2. To the extent that work required by this Consent Order, or by any approved Scope of Work or Workplan prepared pursuant

hereto, must be done on property not owned or controlled by Respondent, Respondent shall use its best efforts to obtain site access agreements from the present owner(s) of such property within 21 calendar days of receipt of EPA approval of any Scope of Work or Workplan pursuant to this Order which requires work on property which is not owned or controlled by Respondent. Best efforts as used in this paragraph shall include, at a minimum, but shall not be limited to, a certified letter from Respondent to the present owners of such property requesting access agreements to permit Respondent and EPA and their authorized representatives to access such property. In the event that agreements for access are not obtained within 21 calendar days after receipt of EPA approval of any Scope of Work or Workplan pursuant to this Order which requires work on property which is not owned or controlled by Respondent, the Respondent shall notify EPA, in writing, within seven (7) calendar days regarding both the efforts undertaken to obtain access and the failure to obtain such agreements. EPA at its discretion, may undertake action to arrange for access so that Respondent and its representatives can perform the required work.

3. Nothing in this section limits or otherwise affects EPA's right of access and entry pursuant to applicable law, including, but not limited to, RCRA and CERCLA.

X. SAMPLING AND DATA/DOCUMENT AVAILABILITY

1. The Respondent shall submit to EPA the results of all sampling and/or tests or other data generated by, or on behalf of the Respondent, in accordance with the requirements of this Consent Order and its attachments appended hereto and upon written request by EPA.

2. Respondent shall notify EPA at least 15 calendar days before engaging in any field activities, such as well drilling, installation of equipment, or sampling. At the request of EPA, Respondent shall provide or allow EPA or its authorized representative to take split or duplicate samples of all samples collected by Respondent pursuant to this Consent Order. Similarly, at the request of Respondent, EPA shall allow Respondent or its authorized representatives to take split or duplicate samples of all samples collected by EPA under this Consent Order. EPA will notify Respondent at least five (5) days before conducting any sampling under this Consent Order.

3. Respondent may assert a business confidentiality claim covering all or part of any information submitted to EPA pursuant to this Consent Order in the manner described in 40 C.F.R. § 2.203(b). Any assertion of confidentiality shall

be adequately substantiated by Respondent when the assertion is made in accordance with 40 C.F.R. § 2.204(e)(4). Information determined to be confidential by EPA shall be disclosed only to the extent permitted by 40 C.F.R. Part 2, Subpart B. If no such confidentiality claim accompanies the information when it is submitted to EPA, it may be made available to the public by EPA without further notice to the Respondent. Respondent agrees not to assert any confidentiality claim with regard to any physical, sampling, monitoring, or analytical data.

XI. RECORD PRESERVATION

Respondent agrees that it shall preserve, during the pendency of this Consent Order and for a minimum of six (6) calendar years after its termination, all data, records and documents in its possession or in the possession of its divisions, officers, directors, employees, agents, contractors, successors and assigns which relate in any way to this Consent Order or to hazardous waste management and/or disposal at the Facility. After 6 calendar years, Respondent shall, prior to destruction, make such records available to EPA for inspection or shall provide copies of any such records to EPA. Respondent shall notify EPA at least 30 days prior to the destruction of any such records, and shall provide EPA with the opportunity to take possession of any such records.

XII. PROJECT COORDINATOR

1. On or before the effective date of this Consent Order, as described in Section XXV, "EFFECTIVE DATE," below, EPA and Respondent shall each designate a Project Coordinator. Respondent shall notify EPA in writing of the Project Coordinator it has selected. Each Project Coordinator shall be responsible for overseeing the implementation of this Consent Order. The EPA Project Coordinator will be EPA's primary designated representative at the Facility. To the maximum extent possible all communications between Respondent and EPA, and all documents, reports, approvals, and other correspondence concerning the activities performed pursuant to the terms and conditions of this Consent Order, shall be directed through the Project Coordinators.

2. The parties agree to provide at least ten (10) calendar days written notice prior to changing Project Coordinators.

3. If EPA determines that activities in compliance or noncompliance with this Consent Order, have caused or may cause a release of hazardous waste, hazardous constituent,

or a pollutant or contaminant, or a threat to the public health or to the environment, EPA may order Respondent to stop further implementation of this Consent Order for such period of time as may be needed to abate any such release or threat and/or to undertake any action which EPA determines is necessary to abate such release or threatened release. Within 7 calendar days after any such order, EPA shall provide Respondent with a written statement of the specific activities halted or to be halted and the reasons therefor.

4. The absence of the EPA Project Coordinator from the Facility shall not be cause for the stoppage of work.

XIII. NOTIFICATION

Unless otherwise specified, reports, correspondence, approvals, disapprovals, notices or other submissions relating to or required under this Consent Order shall be in writing and shall be sent to:

1. Four copies of all documents to be submitted to the EPA shall be sent to:

William L. Walsh (3HW11)
Environmantal Protection Specialist
U.S. EPA, Region III
841 Chestnut Building
Philadelphia, PA 19107

2. Documents to be submitted to the Respondent shall be sent to:

Chemclene Corporation
Malvern, Pennsylvania

XIV. DELAY IN PERFORMANCE/STIPULATED PENALTIES

1. Unless there has been a written modification of a compliance date by EPA, or excusable delay, as defined in Section XVI, "FORCE MAJEURE and EXCUSABLE DELAY," below, in the event Respondent fails to meet any requirement set forth in this Consent Order, Respondent shall pay stipulated penalties, as set forth below. Compliance by Respondent shall include commencement or completion of an activity under this Consent Order or a plan approved under this Consent Order or any matter under this Consent Order in an acceptable manner and within the specified time schedules in and approved under this Consent Order. All "minor violations" shall be payable as set forth in paragraph 8(a) of this section. Minor violations shall be defined as:

(a) Failure to submit bimonthly progress reports or sampling data by the specified due date;

(b) Failure to notify EPA of a change in the designated Project Coordinator, as set forth in Section XII(2), above;

(c) Failure to give at least fourteen (14) calendar days notice of the time and location of all sampling efforts, pursuant to Section X(2), above; and

(d) Failure to abide by the record preservation requirements set forth in Section XI, above.

All other noncompliances shall be deemed as "major," and payable as set forth in paragraph 8(b) of this Section XIV, unless EPA determines that a violation should be considered minor under the circumstances of the noncompliance.

2. All penalties shall begin to accrue on the day after complete performance is due or a violation occurs, and shall continue to accrue through the final day or correction of the noncompliance. Nothing herein shall prevent the simultaneous accrual of separate penalties for separate and distinct violations of this Consent Order.

3. Following the EPA's determination that Respondent has failed to comply with any of the requirements of this Consent Order, EPA shall give Respondent written notification of same, describing the noncompliance. Said notice shall also indicate the amount of penalties due.

4. All penalties owed to EPA under this Section XIV shall be due within 30 calendar days of receipt of the notification of noncompliance, unless Respondent invokes the dispute resolution procedures under Section XV, below. Interest shall begin to accrue on the unpaid balance at the end of the 30 day period at the prevailing Treasury rate. Penalties shall accrue from the date of violation regardless of whether EPA has notified Respondent of a violation. All penalties shall be made by certified or cashier's check payable to the Treasurer of the United States of America and shall be remitted to:

U.S. EPA -- Regional Hearing Clerk
P. O. Box 360515M
Pittsburgh, PA 15251

All payments shall reference the name of the Facility, the Respondent's name and address, and the EPA docket number of this action. Copies of the transmittal of payment shall be sent simultaneously to the EPA Project Coordinator and the Regional Hearing Clerk (3RC00), U.S. Environmental Protection Agency, Region III, 841 Chestnut Building, Philadelphia, PA 19107.

5. Respondent may dispute the EPA's right to the stated amount of penalties by invoking the dispute resolution procedures under Section XV, below. If Respondent does not prevail upon resolution of the dispute, EPA has the right to collect all penalties which accrued prior to and during the period of dispute. To the extent Respondent prevails upon resolution of the dispute no penalties shall be payable for those penalties which were specifically resolved.

6. Neither the filing of a petition to resolve a dispute nor the payment of penalties shall alter in any way Respondent's obligation to comply with the requirements of this Consent Order.

7. If Respondent fails to pay stipulated penalties, the EPA may institute proceedings to collect the penalties. However, nothing in this section shall be construed as prohibiting, altering, or in any way limiting the ability of the EPA to seek any other remedies or sanctions which may be available to EPA by virtue of Respondent's failure to comply with any of the requirements of this Consent Order or of the statutes and regulations upon which it is based.

8(a). The following per diem stipulated penalties shall be payable per violation per day to EPA for any minor violation identified in paragraph 1 of this section:

Amount/Day	Period of Noncompliance
$500	Day 1-3
$1,000	Beyond Day 3

(b). The following per diem stipulated penalties shall be payable per violation per day to EPA for all other violations which are not specifically defined as minor violations in paragraph 1 of this section:

Amount/Day	Period of Noncompliance
$3,000	Day 1-7
$5,000	Beyond Day 7

XV. DISPUTE RESOLUTION

1. If Respondent disagrees, in whole or in part, with any EPA disapproval or modification or other decision or directive made by EPA pursuant to this Consent Order, Respondent shall notify EPA in writing of its objections and the basis therefor within 15 calendar days of receipt of EPA's disapproval, decision or directive. Said notice shall set forth the specific points of the dispute, the position Respondent is maintaining should be adopted as consistent with the

requirements of this Consent Order, the basis for Respondent's position, and any matters which it considers necessary for EPA's determination. Within 10 business days of EPA's receipt of such written notice, EPA shall provide to Respondent its decision on the pending dispute which shall be binding upon both parties to this Consent Order.

2. The existence of a dispute as defined herein, and EPA's consideration of such matters as placed into dispute shall not excuse, toll or suspend any compliance obligation or deadline required pursuant to this Consent Order during the pendency of the dispute resolution process.

3. Notwithstanding any other provision of this Consent Order, no action or decision by EPA, including without limitation decisions of the Regional Administrator or his/her designee, Region III, pursuant to this Consent Order shall constitute final agency action giving rise to any rights to judicial review prior to EPA's initiation of judicial action to compel Respondent's compliance with the mandate(s) of this Order.

XVI. FORCE MAJEURE AND EXCUSABLE DELAY

1. Respondent shall perform the requirements of this Consent Order within the time limits set forth herein, unless the performance is prevented or delayed by events which constitute a force majeure. Respondent shall have the burden of proving such a force majeure. A force majeure is defined as any event arising from causes not reasonably foreseeable and beyond the control of Respondent which could not be overcome by due diligence and which delays or prevents performance by a date or in the manner required by this Consent Order. Such events do not include increased costs of performance, changed economic circumstances, or failure to obtain Federal, State, or local permits.

2. Respondent shall notify EPA in writing within three (3) calendar days after it becomes aware of events which Respondent claims constitute a force majeure. Such notice shall estimate the anticipated length of delay, including necessary demobilization and remobilization, its cause, measures taken or to be taken to minimize the delay, and an estimated timetable for implementation of these measures. Failure to comply with the notice provision of this section shall constitute a waiver of Respondent's right to assert a force majeure claim.

3. If EPA determines that the delay has been or will be caused by circumstances not reasonably foreseeable and beyond the control of Respondent, which cannot be overcome by due

diligence, the time for performance for that element of the relevant Scopes of Work or Work Plans may be extended, upon EPA approval, for a period equal to the delay resulting from such circumstances. This shall be accomplished through an amendment to this Consent Order pursuant to Section XXI, "SUBSEQUENT MODIFICATION," below. Such an extension does not alter the schedule for performance or completion of other tasks required by any Scope of Work or Work Plan unless these are also specifically altered by amendment of the Consent Order. In the event that EPA and Respondent cannot agree that any delay or failure has been or will be caused by circumstances not reasonably foreseeable and beyond the control of Respondent, which cannot be overcome by due diligence, or if there is no agreement on the length of the extension, the dispute shall be resolved in accordance with the Dispute Resolution provisions of Section XV, "DISPUTE RESOLUTION," herein.

XVII. RESERVATION OF RIGHTS

1. EPA expressly reserves all rights and defenses that it may have, including the right both to disapprove of work performed by Respondent pursuant to this Order and to request that Respondent perform tasks in addition to those stated in the Workplan or Scope(s) of Work.

2. EPA hereby reserves all of its statutory and regulatory powers, authorities, rights, remedies, both legal and equitable, which may pertain to Respondent's failure to comply with any of the requirements of this Consent Order, including without limitation the assessment of penalties under §3008(h)(2) of RCRA, 42 U.S.C. 6928(h)(2). This Consent Order shall not be construed as a covenant not to sue, release, waiver or limitation of any rights, remedies, powers and/or authorities, civil or criminal, which EPA has under RCRA, CERCLA, or any other statutory, regulatory or common law enforcement authority of the United States.

3. Compliance by Respondent with the terms of this Consent Order shall not relieve Respondent of its obligations to comply with RCRA or any other applicable local, State or Federal laws and regulations.

4. The entry of this Consent Order and Respondent's consent to comply shall not limit or otherwise preclude the EPA from taking additional enforcement action pursuant to Section 3008(h) of RCRA, 42 U.S.C. § 6928(h), should the EPA determine that such actions are warranted.

5. This Consent Order is not intended to be nor shall it be construed as, a permit. This Consent Order does not relieve Respondent of any obligation to obtain and comply with any local, State, or Federal permits.

6. EPA reserves the right to perform any portion of the work consented to herein or any additional site characterization, feasibility study, and response/corrective actions as it deems necessary to protect public health and the environment. EPA may exercise its authority under RCRA Section 7003 and CERCLA to undertake removal actions or remedial actions at any time. In any event, EPA reserves its right to seek reimbursement from Respondent for such additional costs incurred by the United States. Notwithstanding compliance with the terms of this Consent Order, Respondent is not released from liability, if any, for the costs of any response actions taken by EPA.

XVIII. OTHER CLAIMS

Nothing in this Consent Order shall constitute or be construed as a release from any claim, cause of action or demand in law or equity against any person, firm, partnership, or corporation for any liability it may have arising out of or relating in any way to the generation, storage, treatment, handling, transportation, release, or disposal of any hazardous constituents, hazardous substances, hazardous wastes, pollutants, or contaminants found at, taken to, or taken from the Facility. Nothing in this Consent Order shall affect any right claim, interest, or cause of action of any party hereto with respect to third parties.

XIX. OTHER APPLICABLE LAWS

All actions required to be taken pursuant to this Consent Order shall be undertaken in accordance with the requirements of all applicable local, State, and Federal laws and regulations. Respondent shall obtain or cause its representatives to obtain all permits and approvals necessary under such laws and regulations.

XX. INDEMNIFICATION OF THE UNITED STATES GOVERNMENT

Respondent agrees to indemnify and save and hold harmless the United States Government, its agencies, departments, agents, and employees, from any and all claims or causes of action arising from or on account of acts or omissions of Respondent or its agents, independent contractors, receivers, trustees, and assigns in carrying out activities required by this Consent Order. This indemnification shall not be construed in any way as affecting or limiting the rights or obligations of Respondent or the United States under their various contracts.

XXI. SUBSEQUENT MODIFICATION

1. This Consent Order may only be amended by mutual agreement of EPA and Respondent. Such amendments shall be in writing, shall be signed by both parties, shall have as their effective date the date on which they are signed by EPA, and shall be incorporated into this Consent Order.

2. The RFI Workplan required by this Consent Order is, upon written approval by EPA, incorporated into this Consent Order. Any non-compliance with such EPA-approved plan, schedules, and attachments shall be considered a violation of this Consent Order and shall subject Respondent to the stipulated penalty provisions included in Section XV, "DELAY IN PERFORMANCE/STIPULATED PENALTIES," above.

3. No informal advice, guidance, suggestions, or comments by EPA regarding reports, plans, specifications, schedules, and any other writing submitted by Respondent will be construed as relieving Respondent of its obligation to obtain written approval, if and when required by this Consent Order.

XXII. SEVERABILITY

If any provision or authority of this Consent Order or the application of this Consent Order to any party or circumstances is held by any judicial or administrative authority to be invalid, the application of such provisions to other parties or circumstances and the remainder of the Consent Order shall remain in full force and shall not be affected thereby.

XXIII. TERMINATION AND SATISFACTION

The provisions of this Consent Order shall be deemed satisfied upon Respondent's receipt of written notice from EPA that Respondent has demonstrated, to the satisfaction of EPA, that the terms of this Consent Order, including any additional tasks, have been satisfactorily completed. This notice shall not, however, terminate any of Respondent's continuing obligations or promises, including but not limited to, Section XI "RECORD PRESERVATION," "RESERVATION OF RIGHTS," and Section XVI "OTHER APPLICABLE LAWS."

XXIV. EFFECTIVE DATE

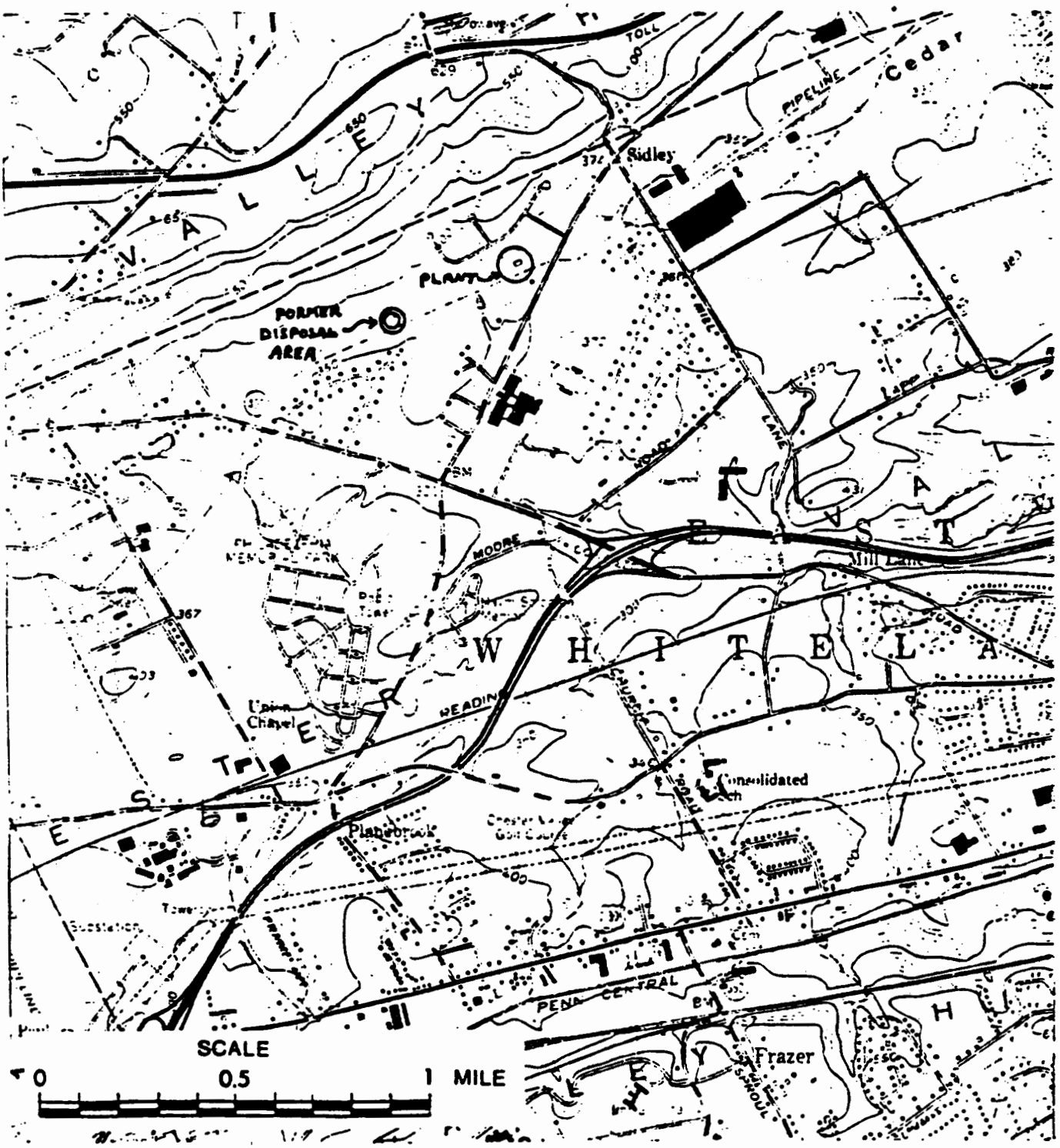
The effective date of this Consent Order shall be the date on which it is signed by EPA. Because this Order was entered with the consent of both parties, Respondent waives its right to request a public hearing pursuant to Section 3008(b) of RCRA, 42 U.S.C. § 6928(b).

IT IS SO AGREED AND ORDERED:

DATE:_____ BY:_____
CHEMCLENE CORPORATION
(Name)
(Title)

DATE:_____ BY:_____
James M. Seif
Regional Administrator
U.S. Environmental Protection Agency
Region III

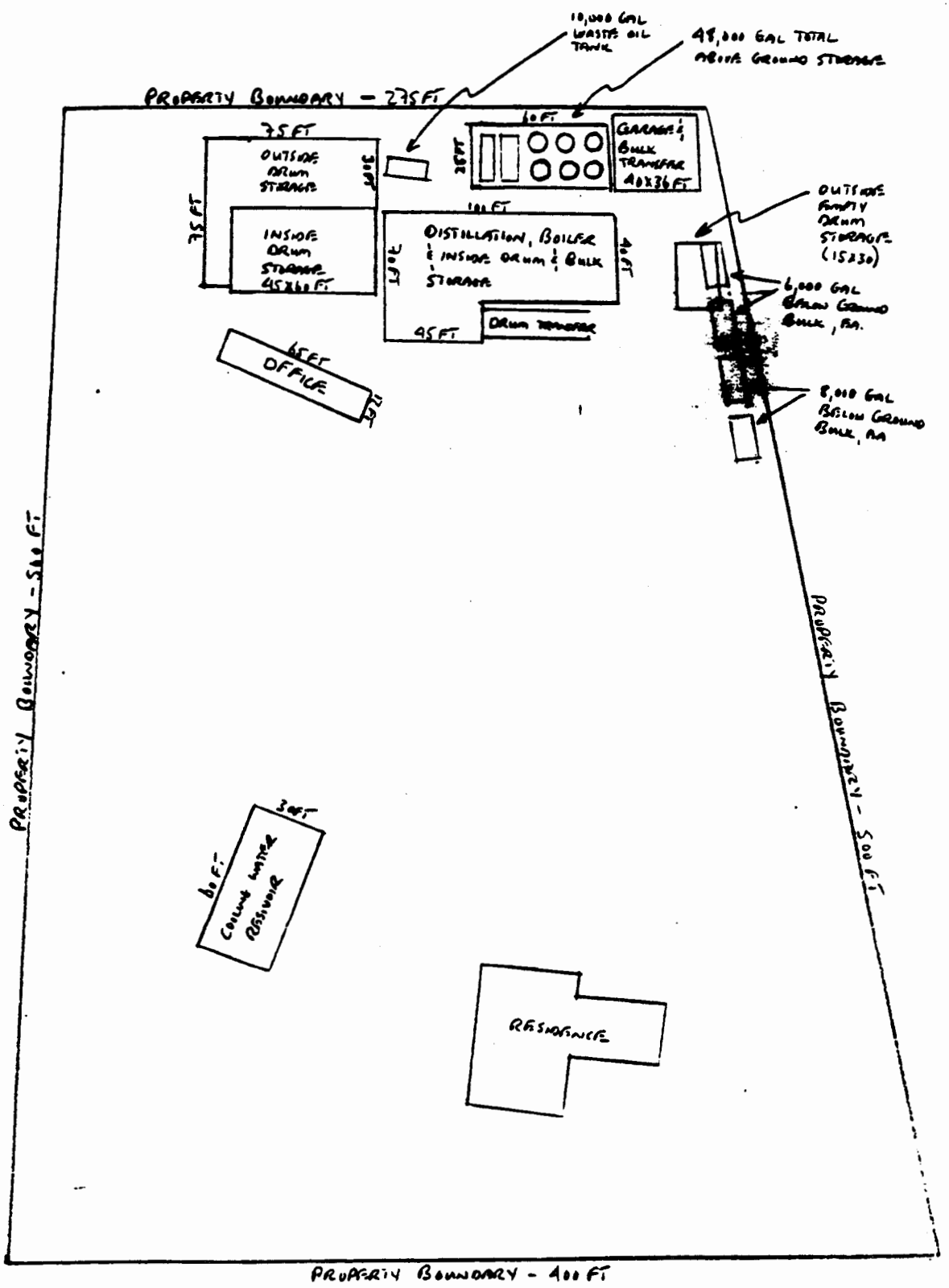
ATTACHMENT 1



Location of Chemclene Corporation former disposal area and plant, Malvern 7 1/2 min. quadrangle.

Form Approved OMB No. 158-S80004

V. FACILITY DRAWING



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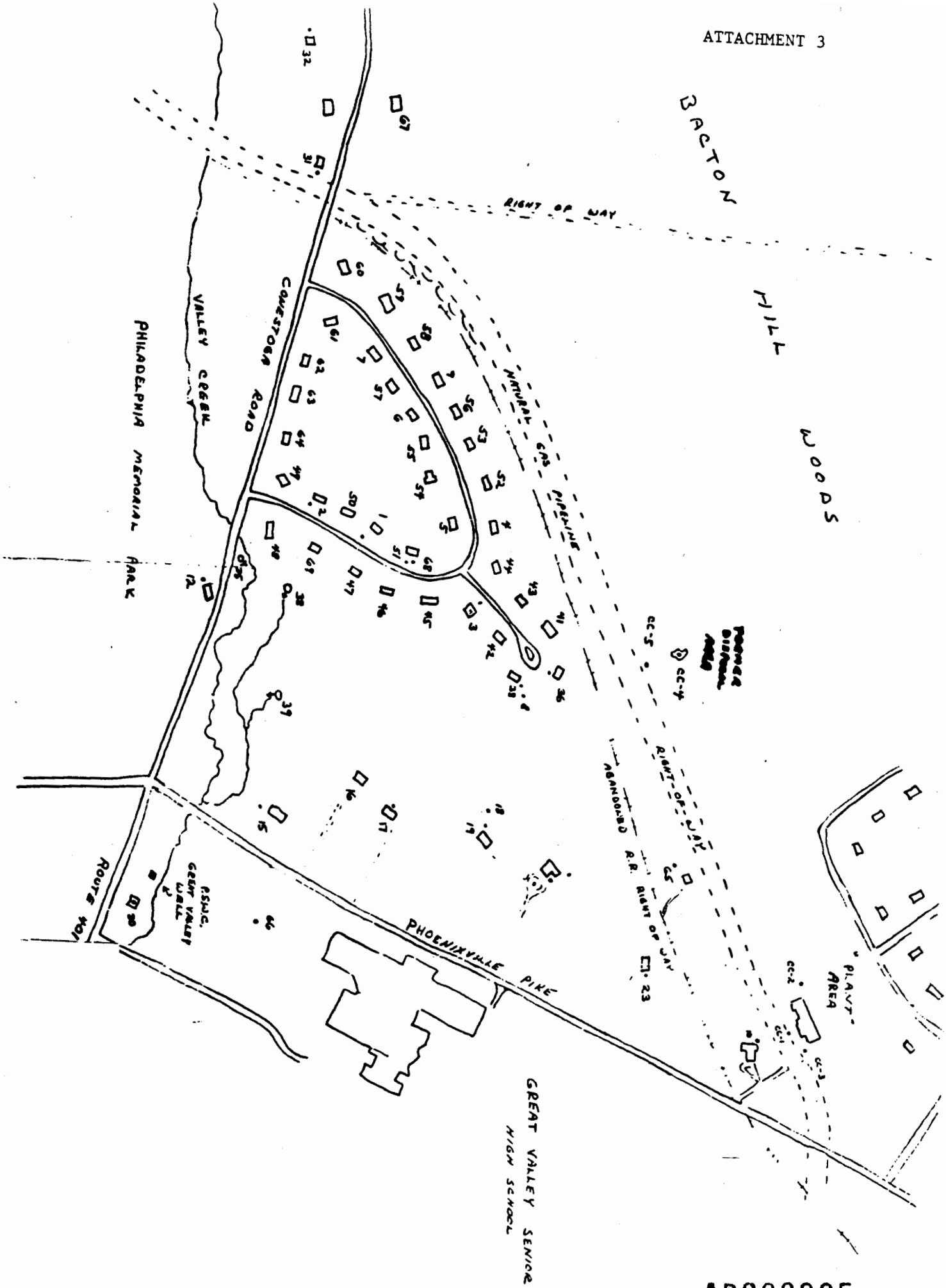
ATTACHMENT 3



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ATTACHMENT 4

SCOPE OF WORK FOR A RCRA FACILITY INVESTIGATION (RFI) AT CHEMCLENE CORPORATION

PURPOSE

The purpose of this RCRA Facility Investigation is to determine the nature and extent of releases of hazardous waste or constituents from regulated units, solid waste management units, and other source areas at the facility and to gather all necessary data to support the Corrective Measures Study. The Respondent shall furnish all personnel, materials, and services necessary for, or incidental to, performing the RCRA remedial investigation at Chemclene Corporation.

SCOPE

The RCRA Facility Investigation consists of seven tasks:

Task I: Description of Current Conditions

- A. Facility Background
- B. Nature and Extent of Contamination

Task II: Pre-Investigation Evaluation of Corrective Measure Technologies

Task III: RFI Workplan Requirements

- A. Project Management Plan
- B. Data Collection Quality Assurance Plan
- C. Data Management Plan
- D. Health and Safety Plan
- E. Community Relations Plan

Task IV: Facility Investigation

- A. Environmental Setting
- B. Source Characterization
- C. Contamination Characterization
- D. Potential Receptor Identification

Task V: Investigation Analysis

- A. Data Analysis
- B. Protection Standards

Task VI: Reports

- A. Preliminary and Workplan
- B. Progress
- C. Draft and Final

TASK I: DESCRIPTION OF CURRENT CONDITIONS

The Respondent shall submit for U.S. EPA approval a report providing the background information pertinent to the facility, contamination and interim measures as set forth below. The data gathered during any previous investigations or inspections and other relevant data shall be included.

A. Facility Background

The Respondent's report shall summarize the regional location, pertinent boundary features, general facility physiography, hydrogeology, and historical use of the facility for the treatment, storage or disposal of solid and hazardous waste. The Respondent's report shall include:

1. Map(s) depicting the following:

   a. General geographic location;

   b. Property lines, with the owners of all adjacent property clearly indicated;

   c. Topography and surface drainage (with a contour interval of 2 feet and a scale of 1 inch = 100 feet), depicting all waterways, wetlands, floodplains, water features, drainage patterns;

   d. All tanks, buildings, utilities, paved areas, easements, rights-of-way, and other features;

   e. All solid or hazardous waste treatment, storage or disposal areas active after November 19, 1980;

   f. All known past solid or hazardous waste treatment, storage, or disposal areas and all known spill, fire, or other accidental release locations regardless of whether they were active on November 19, 1980;

   g. All known past and present product and waste underground tanks or piping;

   h. Surrounding land uses (residential, commercial, agricultural, recreational); and

   i. The location of all production and ground water monitoring wells. These wells shall be clearly labeled and ground and top of casing elevations included (these elevations may be included as an attachment).

All maps shall be consistent with the requirements set forth in 40 CFR § 270.14 and be of sufficient detail and accuracy to locate and report all current and future work performed at the site;

2. A history and description of ownership and operation, solid and hazardous waste generation, treatment, storage, and disposal activities at the facility;

3. Approximate dates or periods of past product and waste spills, identification of the materials spilled, the amount spilled, the location where spilled, and a description of the response actions conducted (local, State, or Federal response units or private parties), including any inspection reports or technical reports generated as a result of the response; and

4. A summary of past permits requested and/or received, any enforcement actions and their subsequent responses, and a list of documents and studies prepared for the facility.

B. Nature and Extent of Contamination

The Respondent shall prepare and submit for U.S. EPA approval a preliminary report describing the existing information on the nature and extent of contamination.

1. The Respondent's report shall summarize all possible source areas of contamination. This, at a minimum, should include all regulated units, solid waste management units, spill areas, and other suspected source areas of contamination. For each area, the Respondent shall identify the following:

   a. Location of unit/area (which shall be depicted on a facility map);

   b. Quantities of solid and hazardous wastes;

   c. Hazardous waste or constituents, to the extent known; and

   d. Identification of areas where additional information is necessary.

2. The Respondent shall prepare an assessment and description of the existing degree and extent of contamination. This should include:

a. Available monitoring data and qualitative information on locations and levels of contamination at the facility;

b. All potential migration pathways including information on geology, pedology, hydrogeology, physiography, hydrology, water quality, meterology, and air quality; and

c. The potential impact(s) on human health and the environment, including demography, ground water and surface water use, and land use.

TASK II: PRE-INVESTIGATION EVALUATION OF CORRECTIVE MEASURE TECHNOLOGIES

Prior to starting the facility investigation, the Respondent shall submit to EPA a report that identifies the potential corrective measure technologies known to Respondent at the time of report submittal that may be used on-site or off-site for the containment, treatment, remediation, and/or disposal of contamination. This report shall also identify any field, laboratory, bench- or pilot-scale data that needs to be collected in the facility investigation to facilitate the evaluation and selection of the final corrective measure or measures (e.g., compatibility of waste and construction materials, information to evaluate effectiveness, treatability of wastes, etc.).

TASK III: RFI WORKPLAN REQUIREMENTS

The Respondent shall prepare a RCRA Facility Investigation (RFI) Workplan. This RFI Workplan shall include the development of several plans, which shall be prepared concurrently. During the RCRA Facility Investigation, it may be necessary to revise the RFI Workplan to increase or decrease the detail of information collected to accommodate the facility specific situation. The RFI Workplan includes the following:

A. Project Management Plan

The Respondent shall prepare a Project Management Plan which will include a discussion of the technical approach, schedules, budget, and personnel. The Project Management Plan will also include a description of qualifications of personnel performing or directing the RFI, including contractor personnel. This plan shall also document the overall management approach to the RCRA Facility Investigation.

B. Data Collection Quality Assurance Plan

The Respondent shall prepare a plan to document all monitoring procedures: sampling, field measurements and sample analysis performed during the investigation to characterize the environmental setting, source, and contamination, so as to ensure that all information, data and resulting decisions are technically sound, statistically valid, and properly documented.

1. Data Collection Strategy

The strategy section of the Data Collection Quality Assurance Plan shall include but not be limited to the following:

a. Description of the intended uses for the data, and the necessary level of precision and accuracy for these intended uses;

b. Description of methods and procedures to be used to assess the precision, accuracy, and completeness of the measurement data;

c. Description of the rational used to assure that the data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, a process condition, or an environmental condition. Examples of factors which shall be considered and discussed include:

i) Environmental conditions at the time of sampling;

ii) Number of sampling points;

iii) Representativeness of selected media; and

iv) Representativeness of selected analytical parameters.

d. Description of the measures to be taken to assure that the following data sets can be compared to each other:

i) RFI data generated by the Respondent;

ii) RFI data generated by an outside laboratory or consultant versus data generated by the Respondent;

iii) Data generated by separate consultants or laboratories; and

iv) Data generated by an outside consultant or laboratory.

e. Details relating to the schedule and information to be provided in quality assurance reports. The reports should include but not be limited to:

i) Periodic assessment of measurement data accuracy, precision, and completeness;

ii) Results of performance audits;

iii) Results of system audits;

iv) Significant quality assurance problems and recommended solutions; and

v) Resolutions of previously stated problems.

2. Sampling

The Sampling section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate sampling locations, depths, etc.;

b. Providing a statistically sufficient number of sampling sites;

c. Measuring all necessary ancillary data;

d. Determining conditions under which sampling should be conducted;

e. Determining which media are to be sampled (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of sampling and length of sampling period;

h. Selecting the types of sample (e.g., composites vs. grabs) and number of samples to be collected;

i. Measures to be taken to prevent contamination of the sampling equipment and cross contamination between sampling points;

j. Documenting field sampling operations and procedures, including;

   i) Documentation of procedures for preparation of reagents or supplies which become an integral part of the sample (e.g., filters, and adsorbing reagents);

   ii) Procedures and forms for recording the exact location and specific considerations associated with sample acquisition;

   iii) Documentation of specific sample preservation method;

   iv) Calibration of field devices;

   v) Collection of replicate samples;

   vi) Submission of field-biased blanks, where appropriate;

   vii) Potential interferences present at the facility;

viii) Construction materials and techniques, associated with monitoring wells and piezometers;

ix) Field equipment listing and sample containers;

x) Sampling order; and

xi) Decontamination procedures.

j. Selecting appropriate sample containers;

k. Sample preservation; and

l. Chain-of-custody, including:

i) Standardized field tracking reporting forms to establish sample custody in the field prior to shipment; and

ii) Pre-prepared sample labels containing all information necessary for effective sample tracking.

3. Field Measurements

The Field Measurements section of the Data Collection Quality Assurance Plan shall discuss:

a. Selecting appropriate field measurement locations, depths, etc.;

b. Providing a statistically sufficient number of field measurements;

c. Measuring all necessary ancillary data;

d. Determining conditions under which field measurement should be conducted;

e. Determining which media are to be addressed by appropriate field measurements (e.g., ground water, air, soil, sediment, etc.);

f. Determining which parameters are to be measured and where;

g. Selecting the frequency of field measurement and length of field measurements period; and

h. Documenting field measurement operations and procedures, including:

i) Procedures and forms for recording raw data and the exact location, time, and facility-specific considerations associated with the data acquisition;

ii) Calibration of field devices;

iii) Collection of replicate measurements;

iv) Submission of field-biased blanks, where appropriate;

v) Potential interferences present at the facility;

vi) Construction materials and techniques associated with monitoring wells and piezometers used to collect field data;

vii) Field equipment listing;

viii) Order in which field measurements were made; and

ix) Decontamination procedures.

4. Sample Analysis

The Sample Analysis section of the Data Collection Quality Assurance Plan shall specify the following:

a. Chain-of-custody procedures, including:

i) Identification of a responsible party to act as sample custodian at the laboratory facility authorized to sign for incoming field samples, obtain documents of shipment, and verify the data entered onto the sample custody records;

ii) Provision for a laboratory sample custody log consisting of serially numbered standard lab-tracking report sheets; and

iii) Specification of laboratory sample custody procedures for sample handling, storage, and dispersement for analysis.

b. Sample storage procedures and storage times;

c. Sample preparation methods;

d. Analytical procedures, including:

   i) Scope and application of the procedure;

   ii) Sample matrix;

   iii) Potential interferences;

   iv) Precision and accuracy of the methodology; and

   v) Method detection limits.

e. Calibration procedures and frequency;

f. Data reduction, validation, and reporting;

g. Internal quality control checks, laboratory performance and systems audits and frequency, including:

   i) Method blank(s);

   ii) Laboratory control sample(s);

   iii) Calibration check sample(s);

   iv) Replicate sample(s);

   v) Matrix-spiked sample(s);

   vi) "Blind" quality control sample(s);

   vii) Control charts;

   viii) Surrogate samples;

   ix) Zero and span gases; and

   x) Reagent quality control checks.

h. Preventive maintenance procedures and schedules;

i. Corrective action (for laboratory problems); and

j. Turnaround time.

C. Data Management Plan

The Respondent shall develop and initiate a Data Management Plan to document and track investigation data and results. This plan shall identify and set up data documentation materials and procedures, project file requirements, and project-related progress reporting procedures and documents. The plan shall also provide the format to be used to present the raw data and conclusions of the investigation.

1. Data Record

The data record shall include the following:

a. Unique sample or field measurement code;

b. Sampling or field measurement location and sample or measurement type;

c. Sampling or field measurement raw data;

d. Laboratory analysis ID number;

e. Property or component measured; and

f. Result of analysis (e.g., concentration).

2. Tabular Displays

The following data shall be presented in tabular displays:

a. Unsorted (raw) data;

b. Results for each medium, or for each constituent monitored;

c. Data reduction for statistical analysis;

d. Sorting of data by potential stratification factors (e.g., location, soil layer, topography); and

e. Summary data.

3. Graphic Displays

The following data shall be presented in graphical formats (e.g., bar graphs, line graphs, area or plan maps, isopleth plots, cross-sectional plots or transects, three dimensional graphs, etc.):

a. Display sampling location and sampling grid;

b. Indicate boundaries of sampling area, and areas where more data are required;

c. Display levels of contamination at each sampling location;

d. Display geographical extent of contamination;

e. Display contamination levels, averages, and maxima;

f. Illustrate changes in concentration in relation to distance from the source, time, depth, or other parameters; and

g. Indicate features affecting intramedia transport and show potential receptors.

D. Health and Safety Plan

The Respondent shall prepare a facility Health and Safety Plan.

1. Major elements of the Health and Safety Plan shall include:

a. Facility description including availability of resources such as roads, water supply, electricity and telephone service;

b. Description of the known hazards and evaluations of the risks associated with the incident and with each activity conducted;

c. List of key personnel and alternates responsible for site safety, responses operations, and for protection of public health;

d. Delineation of work areas;

e. Description of levels of protection to be worn by personnel in work area;

f. Establishment of procedures to control site access;

g. Description of decontamination procedures for personnel and equipment;

h. Establishment of site emergency procedures;

i. Emergency medical care for injuries and toxicological problems;

j. Description of requirements for an environmental surveillance program;

k. Routine and special training required for responders; and

l. Establishment of procedures for protecting workers from weather-related problems.

2. The Facility Health and Safety Plan shall be consistent with:

a. NIOSH Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities (1985);

b. EPA Order 1440.1 - Respiratory Protection;

c. EPA Order 1440.3 - Health and Safety Requirements for Employees engaged in Field Activities;

d. Facility Contingency Plan;

e. EPA Standard Operating Safety Guide (1984);

f. OSHA regulations particularly in 29 C.F.R. 1910 and 1926;

g. State and local regulations; and

h. Other EPA guidance as provided.

E. Community Relations Plan

The Respondent shall prepare a plan, for the dissemination of information to the public regarding investigation activities and results.

TASK IV: FACILITY INVESTIGATION

The Respondent shall conduct those investigations necessary to: characterize the facility (Environmental Setting); define the source (Source Characterization); define the degree and extent of contamination (Contamination Characterization); and identify actual or potential receptors.

The investigations should result in data of adequate technical quality to support the development and evaluation of the corrective measure alternative or alternatives during the Corrective Measures Study.

The site investigation activities shall follow the plans set forth in Task III. All sampling and analyses shall be conducted in accordance with the Data Collection Quality Assurance Plan. All sampling locations shall be documented in a log and identified on a detailed site map.

A. Environmental Setting

The Respondent shall collect information to supplement and verify existing information on the environmental setting at the facility. The Respondent shall characterize the following:

1. Hydrogeology

The Respondent shall conduct a program to evaluate hydrogeologic conditions at the facility. This program shall provide the following information:

a. A description of the regional and facility specific geologic and hydrogeologic characteristics affecting ground water flow beneath the facility, including:

i) Regional and facility specific stratigraphy: description of strata including strike and dip, identification of stratigraphic contacts;

ii) Structural geology: description of local and regional structural features (e.g., folding, faulting, tilting, jointing, etc.);

iii) Depositional history;

iv) Identification and characterization of areas and amounts of recharge and discharge.

v) Regional and facility specific ground water flow patterns; and

vi) Characterize seasonal variations in the ground water flow regime.

b. An analysis of any topographic features that might influence the ground water flow system. (Note: Stereographic analysis of aerial photographs may aid in this analysis).

c. Based on field data, test, and cores, a representative and accurate classification and description of the hydrogeologic units which may be part of the migration pathways at the facility (i.e., the aquifers and any intervening saturated and unsaturated units), including:

i) Hydraulic conductivity and porosity (total and effective);

ii) Lithology, grain size, sorting, degree of cementation;

iii) An interpretation of hydraulic interconnections between saturated zones; and

iv) The attenuation capacity and mechanisms of the natural earth materials (e.g., ion exchange capacity, organic carbon content, mineral content, etc.).

d. Based on field studies and cores, structural geology, and hydrogeologic cross sections showing the extent (depth, thickness, lateral extent) of hydrogeologic units which may be part of the migration pathways identifying:

i) Sand and gravel deposits in unconsolidated deposits;

ii) Zones of fracturing or channeling in consolidated or unconsolidated deposits;

iii) Zones of higher permeability or low permeability that might direct and restrict the flow of contaminants;

iv) The uppermost aquifer: geologic formation, group of formations, or part of a formation capable of yielding a significant amount of ground water to wells or springs; and

v) Water-bearing zones above the first confining layer that may serve as a pathway for contaminant migration including perched zones of saturation.

e. Based on data obtained from ground water monitoring wells and piezometers installed upgradient and downgradient of the potential contaminant source, a representative description of water level or fluid pressure monitoring including:

i) Water-level contour and/or potentiometric maps;

ii) Hydrologic cross sections showing vertical gradients;

iii) The flow system, including the vertical and horizontal components of flow; and

iv) Any temporal changes in hydraulic gradients, for example, due to tidal or seasonal influences.

f. A description of manmade influences that may affect the hydrogeology of the site, identifying:

i) Active and inactive local water-supply and production wells with an approximate schedule of pumping; and

ii) Manmade hydraulic structures (pipelines, french drains, ditches, unlined pond, septic tanks, NPDES outfalls, retention areas, etc.).

2. Soils

The Respondent shall conduct a program to characterize the soil and rock units above the water table in the vicinity of the contaminant release(s). Such characterization shall include but not be limited to, the following information:

a. SCS soil classification;
b. Surface soil distribution;
c. Soil profile, including ASTM classification of soils;
d. Transects of soil stratigraphy;
e. Hydraulic conductivity (saturated and unsaturated);
f. Relative permeability;
g. Bulk density;
h. Porosity;
i. Soil sorptive capacity;
j. Cation exchange capacity (CEC);
k. Soil organic content;
l. Soil pH;
m. Particle size distribution;
n. Depth of water table;
o. Moisture content;
p. Effect of stratification on unsaturated flow;
q. Infiltration
r. Evapotranspiration;
s. Storage capacity;
t. Vertical flow rate; and
u. Mineral content.

3. Surface Water and Sediment

The Respondent shall conduct a program to characterize the surface water bodies in the vicinity of the facility. Such characterization shall include, but not be limited to, the following activities and information:

a. Description of the temporal and permanent surface water bodies including:

i) For impoundments: location, elevation, surface area, depth, volume, freeboard, and purpose of impoundment;

ii) For streams, ditches, drains, swamps, ponds, and channels: location, elevation, flow, velocity, depth, width, seasonal fluctuations, and flooding tendencies (i.e., 100 year event);

iii) Drainage patterns; and

iv) Evapotranspiration.

b. Description of the chemistry of the natural surface water and sediments. This includes determining the pH, total dissolved solids, total suspended solids, conductivity, total organic carbon, biological and chemical oxygen demand, total organic halogens, TCE, 1,1,1-TCA, 1,2-DCE, 1,1-DCA, lead, hexavalent chromium, arsenic, and free cyanide.

c. Description of sediment characteristics including:

i) Deposition area;

ii) Thickness profile; and

iii) Physical and chemical parameters (e.g., grain size, density, organic carbon content, ion exchange capacity, pH, etc.)

B. Source Characterization

The Respondent shall collect analytic data to completely characterize the wastes and the areas where wastes have been placed, including: type; quantity; physical form; disposition (containment or nature of deposits); and facility characteristics affecting release (e.g., facility security, and engineered barriers). This shall include quantification of the following specific characteristics at each source area:

1. Unit/Disposal Area characteristics:

a. Location of unit/disposal area;
b. Type of unit/disposal area;
c. Design features;
d. Operating practices (past and present);
e. Period of operation;
f. Age of unit/disposal area;
g. General physical conditions; and
h. Method used to close the unit/disposal area.

2. Waste Characteristics:

a. Type of waste placed in the unit;

i) Hazardous classification (e.g., flammable, reactive, corrosive, oxidizing, or reducing agent);

ii) Quantity; and

iii) Chemical composition.

b. Physical and chemical characteristics;

i) Physical form (solid, liquid, gas);
ii) Physical description (e.g., powder, oily sludge);
iii) Temperature;
iv) pH;
v) General chemical class (e.g., acid, base, solvent);
vi) Molecular weight;
vii) Density;
viii) Boiling point;
ix) Viscosity;
x) Solubility in water;
xi) Cohesiveness of the waste;
xii) Vapor pressure; and
xiii) Flash point.

c. Migration and dispersal characteristics of the waste;

i) Sorption;

ii) Biodegradability, biocentration, biotransformation;

iii) Photodegradation rates;

iv) Hydrolysis rates; and

v) Chemical transformations.

d. Source characterization must include at a minimum the areas identified in Section IV, Paragraph 2. of the Consent Order, but not necessarily limited to these areas.

The Respondent shall document the procedures used in making the above determinations.

C. Contamination Characterization

The Respondent shall collect analytical data on ground water, soils, surface water, sediment, and subsurface gas contamination in the vicinity of the facility. This data shall be sufficient to define the extent, origin, direction, and rate of movement of containment plumes. Data shall include time and location of sampling, media sampled, concentrations found, and conditions during sampling, and the identity of the individuals performing the sampling and analysis. The Respondent shall address the following types of contamination at the facility:

1. Ground Water Contamination

The Respondent shall conduct a Ground Water Investigation to characterize any plumes of contamination at the facility. This investigation shall at a minimum provide the following information:

a. A description of the horizontal and vertical extent of any immiscible or dissolved plume(s) originating from the facility;

b. The horizontal and vertical direction of contamination movement;

c. The velocity of contaminant movement;

d. The horizontal and vertical concentration profiles of Appendix IX constituents in the plume(s);

e. An evaluation of factors influencing the plume movement; and

f. An extrapolation of future contaminant movement.

The Respondent shall document the procedures used in making the above determinations (e.g., well design, well construction, geophysics, modeling, pump tests, slug tests, etc.). Also, Appendix IX constituents are defined in the July 24, 1986 Federal Register Notice (pps. 26632-26642) for 40 C.F.R. Parts 264 and 270.

2. Soil Contamination

The Respondent shall conduct an investigation to characterize the contamination of the soil and rock units above the water table in the vicinity of the contaminant release. The investigation shall include the following information:

a. A description of the vertical and horizontal extent of contamination.

b. A description of contaminant and soil chemical properties within the contaminant source area and plume. This includes contaminant solubility, speciation, adsorption, leachability, exchange capacity, biodegradability, hydrolysis, photolysis, oxidation, and other factors that might affect contaminant migration and transformation.

c. Specific contaminant concentrations.

d. The velocity and direction of contaminant movement.

e. An extrapolation of future contaminant movement.

The Respondent shall document the procedures used in making the above determinations.

3. Surface Water and Sediment Contamination

The Respondent shall conduct a surface water investigation to characterize contamination in surface water bodies resulting from contaminant releases at the facility.

The investigation shall include, but not be limited to, the following information:

a. A description of the horizontal and vertical extent of any immisicible or dissolved plume(s) originating from the facility, and the extent of contamination in underlying sediments;

b. The horizontal and vertical direction of contaminant movement;

c. The contaminant velocity;

d. An evaluation of the physical, biological, and chemical factors influencing contaminant movement;

e. An extrapolation of future contaminant movement; and

f. A description of the chemistry of the contaminated surface waters and sediments. This includes determining the pH, total dissolved solids, specific contaminant concentrations, etc.;

The Respondent shall document the procedures used in making the above determinations.

4. Subsurface Gas Contamination

The Respondent shall conduct an investigation to characterize subsurface gases emitted from buried hazardous waste and hazardous constituents in the ground water. This investigation shall include the following information:

a. A description of the horizontal and vertical extent of subsurface gases migration;

b. The chemical composition of the gases being emitted;

c. The rate, amount, and density of the gases being emitted; and

d. Horizontal and vertical concentration profiles of the subsurface gases emitted.

The Respondent shall document the procedures used in making the above determinations.

D. Potential Receptors

The Respondent shall collect data describing the human populations and environmental systems that are susceptible to contaminant exposure from the facility. Chemical analysis of biological samples may be needed. Data on observable effects in ecosystems may also be obtained. The following characteristics shall be identified:

1. Local uses and possible future uses of ground water:

   a. Type of use (e.g., drinking water source: municipal or residential, agricultural, domestic/non-potable, and industrial); and

   b. Location of ground water users including wells and discharge areas.

2. Local uses and possible future uses of surface waters draining the facility:

   a. Domestic and municipal (e.g., potable and lawn/gardening watering);
   b. Recreational (e.g., swimming, fishing);
   c. Agricultural;
   d. Industrial; and
   e. Environmental (e.g., fish and wildlife propagation).

3. Human use of or access to the facility and adjacent lands, including but not limited to:

   a. Recreation;
   b. Hunting;
   c. Residential;
   d. Commercial; and
   e. Zoning.

4. A description of the biota in surface water bodies on, adjacent to, or affected by the facility.

5. A description of the ecology overlying and adjacent to the facility.

6. A demographic profile of the people who use or have access to the facility and adjacent land, including, but not limited to: age; sex; and sensitive subgroups.

7. A description of any endangered or threatened species near the facility.

TASK V: INVESTIGATION ANALYSIS

The Respondent shall prepare an analysis and summary of all facility investigations and their results. The objective of this task shall be to ensure that the investigation data are sufficient in quality (e.g., quality assurance procedures have been followed) and quantity to describe the nature and extent of contamination, potential threat to human health and/or the environment, and to support the Corrective Measures Study.

A. Data Analysis

The Respondent shall analyze all facility investigation data outlined in Task IV and prepare a report on the type and extent of contamination at the facility including sources and migration pathways. The report shall describe the extent of contamination (qualitative/quantitative) in relation to background levels indicative for the area.

B. Protection Standards

1. Ground Water Protection Standards

For regulated units the Respondent shall provide information to support the Agency's selection/development of Ground Water Protection Standards for all of the Appendix IX constituents found in the ground water during the Facility Investigation (Task IV).

a. The Ground Water Protection Standards shall consist of:

i) for any constituents listed in Table 1 of 40 C.F.R. 264.94, the respective value given in that table Maximum Contaminant Level (MCL) if the background level of the constituent is below the given value in Table 1; or

ii) the background level of that constituent in the ground water; or

iii) an U.S. EPA approved Alternate Concentration Limit (ACL).

b. Information to support the Agency's selection of Alternate Concentration Limits (ACLs) shall be developed by the Respondent in accordance with U.S. EPA guidance. For any proposed ACLs the Respondent shall include a justification based upon the criteria set forth in 40 C.F.R. 264.94(b).

c. Within thirty (30) calendar days of receipt of any proposed ACLs. The U.S. EPA shall notify the Respondent in writing of approval, disapproval, or modifications, the U.S. EPA shall specify in writing the reason(s) for any disapproval or modification.

d. Within thirty (30) calendar days of receipt of the U.S. EPA's notification or disapproval of any proposed ACL, the Respondent shall amend and submit revisions to the U.S. EPA.

2. Other Relevant Protection Standards

The Respondent shall identify all relevant and applicable standards for the protection of human health and the environment (e.g., National Ambient Air Quality Standards, Federally-approved State water quality standards, etc.).

TASK VI: REPORTS

A. Preliminary and Workplan

The Respondent shall submit to the EPA reports on Tasks I and II when it submits the RCRA Facility Investigation Workplan (Task III).

B. Progress

The Respondent shall at a minimum provide the EPA with signed, bimonthly progress reports containing:

1. A description and estimate of the percentage of the RFI completed;

2. Summaries of all findings;

3. Summaries of all changes made in the RFI during the reporting period;

4. Summaries of all contacts with representative of the local community, public interest groups, or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during the reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

C. Draft and Final

Upon EPA approval, the Respondent shall prepare a RCRA Facility Investigation Report to present Tasks IV-V. The RCRA Facility Investigation Report shall be developed in draft form for U.S. EPA review and approval. The RCRA Facility Investigation Report shall be developed in final format incorporating comments received on the Draft RCRA Facility Investigation Report. Task VI shall be submitted as a separate report when the Final RCRA Facility Investigation Report is submitted for approval.

Four copies of all reports, including the Task I report, Task II report, Task III workplan, Task VI report and both the Draft and Final RCRA Facility Investigation Reports (Task IV-V) shall be provided by the Respondent to U.S. EPA.

ATTACHMENT 5

SCOPE OF WORK FOR A CORRECTIVE MEASURE STUDY AT CHEMCLENE CORPORATION

PURPOSE

The purpose of this Corrective Measure Study (CMS) is to develop and evaluate the corrective action alternative or alternatives and to recommend the corrective measure or measures to be taken at Chemclene Corporation. The Respondent will furnish the personnel, materials, and services necessary to prepare the corrective measure study, except as otherwise specified.

SCOPE

The Corrective Measure Study consists of four tasks:

Task VII: Identification and Development of the Corrective Measure Alternative or Alternatives

- A. Description of Current Situation
- B. Establishment of Corrective Action Objectives
- C. Screening of Corrective Measures Technologies
- D. Identification of the Corrective Measure Alternative or Alternatives

Task VIII: Evaluation of the Corrective Measure Alternative or Alternatives

- A. Technical/Environmental/Human Health/ Institutional
- B. Cost Estimate

Task IX: Justification and Recommendation of the Corrective Measure or Measures

- A. Technical
- B. Environmental
- C. Human Health

Task X: Reports

- A. Progress
- B. Draft
- C. Final

TASK VII: IDENTIFICATION AND DEVELOPMENT OF THE CORRECTIVE ACTION ALTERNATIVE OR ALTERNATIVES

Based on the results of the RCRA Facility Investigation and consideration of the identified Preliminary Corrective Measure Technologies (Task II), the Respondent shall identify, screen, and develop the alternative or alternatives for removal, containment, treatment, and/or other remediation of the contamination based on the objectives established for the corrective action.

A. Description of Current Situation

The Respondent shall submit an update to the information describing the current situation at the facility and the known nature and extent of the contamination as documented by the RCRA Facility Investigation Report. The Respondent shall provide an update to information presented in Task I of the RFI to the Agency regarding previous response activities and any interim measures which have or are being implemented at the facility. The Respondent shall also make a facility-specific statement of the purpose for the response, based on the results of the RCRA Facility Investigation. The statement of purpose should identify the actual or potential exposure pathways that should be addressed by corrective measures.

B. Establishment of Corrective Action Objectives

The Respondent, in conjunction with the EPA, shall establish site specific objectives for the corrective action. These objectives shall be based on public health and environmental criteria, information gathered during the RCRA Facility Investigation, EPA guidance, and the requirements of any applicable Federal statutes. At a minimum, all corrective actions concerning ground water releases from regulated units must be consistent with, and as stringent as, those required under 40 C.F.R. § 264.100.

C. Screening of Corrective Measure Technologies

The Respondent shall review the results of the RCRA Facility Investigation and reassess the technologies specified in the Task II report as approved by EPA and identify additional technologies which are applicable at the facility. The Respondent shall screen the preliminary corrective measure technologies identified in Task II of the RCRA Facility investigation and any supplemental technologies to eliminate those that may prove infeasible to implement, that rely on technologies

unlikely to perform satisfactorily or reliably, or that do not achieve the corrective measure objective within a reasonable time period. This screening process focuses on eliminating those technologies which have severe limitations for a given set of waste and site-specific conditions. The screening step may also eliminate technologies based on inherent technology limitations. Site, waste, and technology characteristics which are used to screen inapplicable technologies are described in more detail below:

1. Site Characteristics

   Site data should be reviewed to identify conditions that may limit or promote the use of certain technologies. Technologies whose use is clearly precluded by site characteristics should be eliminated from further consideration;

2. Waste Characteristics

   Identification of waste characteristics that limit the effectiveness or feasibility of technologies is an important part of the screening process. Technologies clearly limited by these waste characteristics should be eliminated from consideration. Waste characteristics particularly affect the feasibility of in-situ methods, direct treatment methods, and land disposal (on/off-site); and

3. Technology Limitations

   During the screening process, the level of technology development, performance record, and inherent construction, operation, and maintenance problems should be identified for each technology considered. Technologies that are unreliable, perform poorly, or are not fully demonstrated may be eliminated in the screening process. For example, certain treatment methods have been developed to a point where they can be implemented in the field without extensive technology transfer or development.

D. <u>Identification of the Corrective Measure Alternative or Alternatives</u>

The Respondent shall develop the Corrective measure alternative or alternatives based on the corrective action objectives and analysis of Preliminary Corrective Measure Technologies, as presented in Task II of the RCRA Facility investigation and as supplemented following the prepara-

tion of the RFI Report. The Respondent shall rely on engineering practice to determine which of the previously identified technologies appear most suitable for the site. Technologies can be combined to form the overall corrective action alternative or alternatives. The alternative or alternatives developed should represent a workable number of option(s) that each appear to adequately address all site problems and corrective action objectives. Each alternative may consist of an individual technology or a combination of technologies. The Respondent shall document the reasons for excluding technologies, identified in Task II, as supplemented in the development of the alternative or alternatives.

TASK VIII: EVALUATION OF THE CORRECTIVE MEASURE ALTERNATIVE OR ALTERNATIVES

The Respondent shall describe each corrective measure alternative that passes through the Initial Screening in Task VII and evaluate each corrective measure alternative and it's components. The evaluation shall be based on technical, environmental, human health and institutional concerns. The Respondent shall also develop cost estimates of each corrective measure.

A. Technical/Environmental/Human Health/Institutional

The Respondent shall provide a description of each corrective measure alternative which includes but is not limited to the following: preliminary process flow sheets; preliminary sizing and type of construction for buildings and structures; and rough quantities of utilities required. The Respondent shall evaluate each alternative in the four following areas:

1. Technical;

The Respondent shall evaluate each corrective measure alternative based on performance, reliability, implementability, and safety.

a. The Respondent shall evaluate performance based on the effectiveness and useful life of the corrective measure:

i) Effectiveness shall be evaluated in terms of the ability to perform intended functions, such as containment, diversion, removal, destruction, or treatment. The effectiveness of each corrective measure shall be determined either through design specifications or by performance evaluation. Any specific waste or site characteristics which could potentially impede effectiveness shall be considered. The evaluation should also consider the effectiveness of combinations of technologies; and

ii) Useful life is defined as the length of time the level of effectiveness can be maintained. Most corrective measure technologies, with the exception of destruction, deteriorate with time. Often, deterioration can be slowed through proper system operation and maintenance, but the technology eventually may require replacement. Each corrective measure shall

be evaluated in terms of the projected service lives of its component technologies. Resource availability in the future life of the technology, as well as appropriateness of the technologies, must be considered in estimating the useful life of the project.

b. The Respondent shall provide information on the reliability of each corrective measure including their operation and maintenance requirements and their demonstrated reliability:

   i) Operation and maintenance requirements include the frequency and complexity of necessary operation and maintenance. Technologies requiring frequent or complex operation and maintenance activities should be regarded as less reliable than technologies requiring little or straightforward operation and maintenance. The availability of labor and materials to meet these requirements shall also be considered; and

   ii) Demonstrated and expected reliability is a way of measuring the risk and effect of failure. The Respondent should evaluate whether the technologies have been used effectively under analogous conditions; whether the combination of technologies have been used together effectively; whether failure of any one technology has an immediate impact on receptors; and whether the corrective measure has the flexibility to deal with uncontrollable changes at the site.

c. The Respondent shall describe the implementability of each corrective measure including the relative ease of installation (constructability) and the time required to achieve a given level of response:

   i) Constructability is determined by conditions both internal and external to the facility conditions and include such items as location of underground utilities, depth to water table, heterogeneity of subsurface materials, and location of the facility (i.e., remote location vs. a congested urban area). The Respondent shall evaluate what measures can be taken to facilitate construction under these conditions. External factors which affect implementation include the need for

special permits or agreements, equipment availability, and the location of suitable off-site treatment or disposal facilities; and

ii) Time has two components that shall be addressed: the time it takes to implement a corrective measure and the time it takes to actually see beneficial results. Beneficial results are defined as the reduction of contaminants to some acceptable, pre-established level.

d. The Respondent shall evaluate each corrective measure alternative with regard to safety. This evaluation shall include threats to the safety of nearby communities and environments as well as those to workers during implementation. Factors to consider include but are not limited to fire, explosion, and exposure to hazardous substances.

2. Environmental;

The Respondent shall perform an Environmental Assessment for each alternative. The Environmental Assessment shall focus on the facility conditions and pathways of contamination actually addressed by each alternative. The Environmental Assessment for each alternative will include, at a minimum, an evaluation of: the short- and long-term beneficial and adverse effects of the response alternative; any adverse effects on environmentally sensitive areas; and an analysis of measures to mitigate adverse effects.

3. Human Health; and

The Respondent shall assess each alternative in terms of the extent of which it mitigates short- and long-term potential exposure to any residual contamination and protects human health both during and after implementation of the corrective measure. The assessment will describe the levels and characterizations of contaminants on-site, potential exposure routes, and potentially affected population. Each alternative will be evaluated to determine the level of exposure to contaminants and the reduction over time. For management of mitigation measures, the relative reduction of impact will be determined by comparing residual levels of each alternative with existing criteria, standards, or guidelines acceptable to EPA.

4. Institutional.

The Respondent shall assess relevant institutional needs for each alternative. Specifically, the effects of Federal, state and local environmental and public health standards, regulations, guidance, advisories, ordinances, or community relations including requirements for construction and operating permits, on the design, operation, and timing of each alternative.

B. Cost Estimate

The Respondent shall develop an estimate of the cost of each corrective measure alternative (and for each phase or segment of the alternative). The cost estimate shall include both capital and operation and maintenance costs.

1. Capital costs consist of direct (construction) and indirect (nonconstruction and overhead) costs.

a. Direct capital costs include:

i) Construction costs: Costs of materials, labor (including fringe benefits and worker's compensation), and equipment required to install the corrective measure;

ii) Equipment costs: Costs of treatment, containment, disposal, and/or service equipment necessary to implement the action;

iii) Land and site-development costs: Expenses associated with purchase of land and development of existing property; and

iv) Buildings and services costs: Costs of process and nonprocess buildings, utility connections, purchased services, and disposal costs.

b. Indirect capital costs include:

i) Engineering expenses: Costs of administration, design, construction supervision, drafting, and testing of corrective measure alternatives;

ii) Legal fees and license or permit costs: Administrative and technical costs necessary to obtain licenses and permits for installation and operation;

iii) Startup and shakedown costs: Costs incurred during corrective measure startup; and

iv) Contingency allowances: Funds to cover costs resulting from unforeseen circumstances, such as adverse weather conditions, strikes, and inadequate facility characterization.

2. Operation and maintenance costs are post-construction costs necessary to ensure continued effectiveness of a corrective measure. The Respondent shall consider the following operation and maintenance cost components:

a. Operating labor costs: Wages, salaries, training, overhead, and fringe benefits associated with the labor needed for post-construction operations;

b. Maintenance materials and labor costs: Costs for labor, parts, and other resources required for routine maintenance of facilities and equipment;

c. Auxilary materials and energy: Costs of such items as chemicals and electricity for treatment plant operations, water and sewer service, and fuel;

d. Purchased services: Sampling costs, laboratory fees, and professional fees for which the need can be predicted;

e. Disposal and treatment costs: Costs of transporting, treating, and disposing of waste materials, such as treatment plant residues, generated during operations;

f. Administrative costs: Costs associated with administration of corrective measure operation and maintenance not included under other categories;

g. Insurance, taxes, and licensing costs: Costs of such items as liability and sudden accidental insurance; real estate taxes on purchased land or rights-of-way; licensing fees for certain technologies; and permit renewal and reporting costs;

h. Maintenance reserve and contingency funds: Annual payments into escrow funds to cover (1) costs of anticipated replacement or rebuilding of equipment and (2) any large unanticipated operation and maintenance costs; and

i. Other costs: Items that do not fit any of the above categories.

TASK IX: JUSTIFICATION AND RECOMMENDATION OF THE CORRECTIVE MEASURE OR MEASURES

The Respondent shall justify and recommend a corrective measure alternative using technical, human health, and environmental criteria. This recommendation shall include summary tables which allow the alternative or alternatives to be understood easily. Tradeoffs among health risks, environmental effects, and other pertinent factors among the alternatives evaluated shall be highlighted. The U.S. EPA will select the corrective measure alternative or alternatives to be implemented based on the results of Tasks VIII and IX. At a minimum, the following criteria will be used to justify the final corrective measure or measures.

A. Technical

1. Performance - corrective measure or measures which are most effective at performing their intended functions and maintaining the performance over extended periods of time will be given preference;

2. Reliability - corrective measure or measures which do not require frequent or complex operation and maintenance activities and that have proven effective under waste and facility conditions similar to those anticipated will be given preference;

3. Implementability - corrective measure or measures which can be constructed and operated to reduce levels of contamination to attain or exceed applicable standards in the shortest period of time will be preferred; and

4. Safety - corrective measure or measures which pose the least threat to the safety of nearby residents and environments as well as workers during implementation will be preferred.

B. Human Health

The corrective measure or measures must comply with existing U.S. EPA criteria, standards, or guidelines for the protection of human health. Corrective measures which provide the minimum level of exposure to contaminants and the maximum reduction in exposure with time are preferred.

C. Environmental

The corrective measure or measures posing the least adverse impact (or greatest improvement) over the shortest period of time on the environment will be favored.

TASK X: REPORTS

The Respondent shall prepare a Corrective Measure Study Report presenting the results of Task VII through IX and recommending a corrective measure alternative. Four copies of the preliminary report shall be provided by the Respondent.

A. Progress

The Respondent shall at a minimum provide the EPA with signed, bimonthly progress reports containing:

1. A description and estimate of the percentage of the CMS completed;

2. Summaries of all findings;

3. Summaries of all changes made in the CMS during the reporting period;

4. Summaries of all contacts with representative of the local community, public interest groups, or State government during the reporting period;

5. Summaries of all problems or potential problems encountered during the reporting period;

6. Actions being taken to rectify problems;

7. Changes in personnel during reporting period;

8. Projected work for the next reporting period; and

9. Copies of daily reports, inspection reports, laboratory/monitoring data, etc.

B. Draft

The Report shall at a minimum include:

1. A description of the facility;

   a. Site topographic map and preliminary layouts.

2. A summary of the corrective measure or measures;

   a. Description of the corrective measure or measures and rationale for selection;

   b. Performance expectations;

c. Preliminary design criteria and rationale;

d. General operation and maintenance requirements; and

e. Long-term monitoring requirements.

3. A summary of the RCRA Facility Investigation and impact on the selected corrective measure or measures;

a. Field studies (ground-water, surface water, soil, air); and

4. Design and Implementation Precautions;

a. Special technical problems;

b. Additional engineering data required;

c. Permits and regulatory requirements;

d. Access, easements, right-of-way;

e. Health and safety requirements; and

f. Community relations activities.

5. Cost Estimates and Schedules;

a. Capital cost estimate;

b. Operation and maintenance cost estimate; and

c. Project schedule (design, construction, operation).

Four copies of the draft shall be provided by the Respondent to U.S. EPA.

C. Final

The Respondent shall finalize the Corrective Measure Study Report incorporating comments received from EPA on the Draft Corrective Measure Study Report.

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

SEP 12 1988

Mr. Lloyd Balderston
Chemclene Corporation
258 North Phoenixville Pike
Malvern, Pennsylvania 19355

Re: § 3008(h) RCRA Corrective Action Order

Dear Mr. Balderston:

This letter confirms our meeting scheduled for Wednesday, September 14, 1988, at 10:00 AM in the EPA offices.

Although we are happy to meet with you and are sure that the meeting will be very useful, we feel that a more beneficial and productive discussion could take place on September 14th if we could receive your comments to our Consent Order prior to the meeting.

As you know, we have established a 60 day deadline for you to sign the Consent Order. This deadline expires on October 1, 1988. Failure to sign the Consent Order by October 1 may result in EPA pursuing other enforcement options, including issuance of an unilateral corrective action order.

Should you have any questions, please contact Mr. Joseph Kotlinski at (215) 597-8392.

Sincerely,

Neil R. Swanson

Neil R. Swanson,
Assistant Branch Chief
Hazardous Waste Enforcement Branch

cc: Bill Early (3RC22)
Cecil Rodrigues (3RC22)
Bill Walsh (3HW11)

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107

OCT 0 6 1988

CERTIFIED MAIL
RETURN RECEIPT REQUESTED

Robert D. Fox, Esquire
Wolf, Block, Schorr and Solis Cohen
Twelfth Floor, Packard Building
15th and Chestnut Streets
Philadelphia, Pennsylvania 19102

Re: Chemclene Corporation

Dear Mr. Fox:

One of the issues discussed during our October 3, 1988 meeting, involved the "Indemnification of the United States Government." We'd like to propose the language below as a substitute for that section.

NON-LIABILITY OF EPA

EPA shall not be deemed a party to any contract involving Respondent and relating to activities at the Site and is not liable for any claims or causes of action arising from or on account of acts or omissions of Respondent, its officers, employees, contractors, receivers, trustees, agents, or assigns, in carrying out activities pursuant to this Consent Order.

We can discuss this issue further during our meeting at 10:00 AM on Wednesday, October 12, 1988. Thank you for your cooperation.

If you have any questions concerning this matter, please contact Mr. William L. Walsh at (215) 597-1192.

Sincerely,

Joseph A. Kotlinski

Joseph A. Kotlinski, Chief
Corrective Action RCRA
Enforcement Section

cc: William Walsh (3HW11)
William Early (3RC22)
Cecil Rodrigues (3RC22)

AR000076

CHEMCLENE CORPORATION
CERCLA INFORMATION

Cedar Grove Environmental
Analytical Laboratories and Consultants
100 Gallagherville Road
... the corner of Marshallton-Thorndale across from Shannon Airport)
Downingtown, PA 19335 (215) 269-6977

12 Jun 80
Samples

Chemclene Corporation
Mr. Lloyd Balderston
R.D.#1
Malvern, Pa. 19355

7/14/80

Mr. Balderston:
The following results were obtained for 1,1,2 Trichloroethylene analyses of the samples listed below.

Sample I.D.	Result (micrograms/liter)
#1	Below 0.5
#2	Below 0.5
#3	Below 0.5
#5	2.5
#7	Below 0.5
#9	75.6
#41	191
#42	Below 0.5
#43	Below 0.5
#44	0.5
#45	Below 0.5
#46	Below 0.5
#47	Below 0.5
#49	Below 0.5
#50	Below 0.5
#52	Below 0.5
#53	Below 0.5
#54	Below 0.5
#56	14.3
#57	11.4
#58	2.9
#59	Below 0.5
#61	Below 0.5
#63	Below 0.5
#64	Below 0.5
#66	Below 0.5
#67	4.0

FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

ORIGINAL (Red)

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

A Site Inspection
of

Chemclene Corporation
TDD No. F3-8203-09
EPA No. PA-322

Revision Date: August 9, 1982

Presented to: Linda Y. Boornazian, Acting DPO
EPA Region III

Prepared by:

Gregg Crystall

Joseph G. McGovern, FITL III

ecology and environment, inc.

International Specialists in the Environmental Sciences

AR000002

3100

Chemclene Corporation
TDD. No. F3-8203-09
EPA NO. PA-322

ORIGINAL (Red)

TABLE OF CONTENTS

SECTION 1

Chemclene Corporation
TDD No. F3-8203-09
EPA No. PA-322

ORIGINAL (Red)

SUMMARY AND RECOMMENDATIONS

1.1 SUMMARY

Chemclene Corporation previously disposed of drummed wastes in pits in a wooded area on their property. Although this disposal practice ceased in 1976, extensive groundwater contamination is a current problem. Chemclene has given its neighbors carbon filters to protect their potable water supplies. However, there is no monitoring program to assure the effectiveness of this in-line treatment. A Philadelphia Suburban Water Company well is located less than 1/4 mile from the disposal area. The Water company samples this well quarterly and has not uncovered any containation to date.

The two drum disposal pits contain approximately 300 drums. Most of the drums are empty; however, a few appear to be full of a wax like substance. Sample analyses of stained soil next to the drum pits and the contents of one drum show heavy contamination by PCB's and various volatile organics.

This site was not fenced at the time of this inspection and there are homes in close proximity to the site.

The State DER has made an informal agreement with Chemclene for removal of wastes and ground water recovery and monitoring programs at the Chemclene facility.

1.2 RECOMMENDATIONS

Based on the above findings, FIT III's recommendations are as follows:

- o The State's action regarding cleanup, monitoring and recovery of the groundwater and wastes should be followed to assure its progression.
- o A quality control monitoring program on the performance of the filters provided by Chemclene should be implemented.

ORIGINAL
(Red)

SECTION 2

Chemclene Corporation
TDD No. F3-8203-09
EPA No. PA-322

FIELD TRIP REPORT

2.1 INTRODUCTION

On April 8, 1982, FIT III representatives Gregg Crystall, Susan Belski and David Nickerson visited Chemclene for the purpose of completing a site inspection of the drum disposal area on this property. Accompanying FIT on this inspection were PA DER representatives Frank Holmes and Phil Rotstein.

2.2 CONTACTS

Frank Holmes
Phil Rotstein
A DER
Norristown, PA
(215) 631-2420

Lloyd Balderston, President
King Graver, Vice President
Chemclene Corporation
Rt. 29
Malvern, PA 19355
(215) 644-2986

Ken Schull, Vice-President
Research/Environmental Affairs
Phila. Suburban Water Co.
762 Lancaster Avenue
Bryn Mawr, PA 19010
(215) 525-1400

2.3 PERTINENT COMMENTS

Lloyd Balderston - Chemclene has owned this property since 1952 and until 1976, some drummed waste was put into pits on this property. Chemclene is in the process of removing some of the drums and plans to fence in the entire disposal area.

Ken Schull - The Great Valley Well, closest to Chemclene is sampled for volatile organics quarterly and has so far been uncontaminated.

2.4 FIELD OBSERVATIONS

The weather during the site inspection was 45°F. and sunny. There are two drum pits located in a wooded area on property owned by Chemclene and there appeared to be another area where drums were buried adjacent to the drum pits.

Most of the drums that were visible were empty; however, there were a few that were full of a waxy substance. There was much spillage around the drum pits and the location of the pits are in close proximity to homes adjacent to the property.

Although solvent-like odors were noticed in the disposal area, there were no readings above background using the hnu photoionizer; however, there was a slight snow cover on the ground at the time of our visit that may have decreased the volatilization of the waste.

Samples of waste, stained soil and ponded water were collected by FIT III and the inspection concluded at 1300.

2.5 SAMPLE LOG

All samples were taken on 4/8/82 and sent to the US EPA Central Regional Lab in Annapolis for organic priority pollutant analysis. (See site sketch in Section 6 for sample locations.)

Sample Blank (noted as Station 1 on Chain of Custody)
Sample 1, stained soil No. 1, 10:40 (noted as Station 2 on Chain of Custody)
Sample 2, pooled liquid, 10:55 (noted as Station 3 on Chain of Custody)
Sample 3, stained soil No. 2, 10:58 (noted as Station 4 on Chain of Custody)
Sample 4, waxy substance, 11:15 (noted as Station 5 on Chain of Custody)

2.6 IMMEDIATE ACTION ITEMS

- Since the PA DER is negotiating a removal and ground water treatment program with Chemclene to clean up the disposal site, EPA need only monitor the progress of these negotiations.

ORIGINAL
(Red)

SECTION 3

EPA

POTENTIAL HAZARDOUS WASTE SITE SITE INSPECTION REPORT

REGION	SITE NUMBER (to be assigned by Hq)
III	

GENERAL INSTRUCTIONS: Complete Sections I and III through XV of this form as completely as possible. Then use the information on this form to develop a Tentative Disposition (Section II). File this form in its entirety in the regional Hazardous Waste Log File. Be sure to include all appropriate Supplemental Reports in the file. Submit a copy of the forms to: U.S. Environmental Protection Agency; Site Tracking System; Hazardous Waste Enforcement Tack Force (EN-335); 401 M St., SW; Washington, DC 20460

I. SITE IDENTIFICATION

A. SITE NAME	B. STREET (or other identifier)		
Chemclene Corporation	Rt. 29 Old Phoenixville Pike		
C. CITY	**D. STATE**	**E. ZIP CODE**	**F. COUNTY NAME**
Malvern	PA	19355	Chester

G. SITE OPERATOR INFORMATION

1. NAME		2. TELEPHONE NUMBER	
Lloyd Balderston		(215) 644-2986	
3. STREET	**4. CITY**	**5. STATE**	**6. ZIP CODE**
Rt 29	Malvern	PA	19355

H. REALTY OWNER INFORMATION (if different from operator of site)

1. NAME		2. TELEPHONE NUMBER	
Same			
3. CITY		**4. STATE**	**5. ZIP CODE**

I. SITE DESCRIPTION

drum dump in wooded area west of solvent reclamation plant

J. TYPE OF OWNERSHIP

☐ 1. FEDERAL ☐ 2. STATE ☐ 3. COUNTY ☐ 4. MUNICIPAL ☒ 5. PRIVATE

II. TENTATIVE DISPOSITION (complete this section last)

A. ESTIMATE DATE OF TENTATIVE DISPOSITION (mo., day, & yr.)	B. APPARENT SERIOUSNESS OF PROBLEM
6/15/82	☒ 1. HIGH ☐ 2. MEDIUM ☐ 3. LOW ☐ 4. NONE

C. PREPARER INFORMATION

1. NAME	2. TELEPHONE NUMBER	3. DATE (mo., day, & yr.)
Gregg Crystall, FIT III	(609) 665-1515	6/15/82

III. INSPECTION INFORMATION

A. PRINCIPAL INSPECTOR INFORMATION

1. NAME	2. TITLE	
Gregg Crystall	Industrial Hygienist	
3. ORGANIZATION		**4. TELEPHONE NO. (area code & no.)**
Ecology & Environment, Inc.		(609) 665-1515

B. INSPECTION PARTICIPANTS

1. NAME	2. ORGANIZATION	3. TELEPHONE NO.
Susan Belski David Nickerson	Ecology & Environment	(609) 665-1515
Frank Holmes	PA-DER	(215) 631-2420
Philip Rotstein	PA-DER	(215) 631-2420

C. SITE REPRESENTATIVES INTERVIEWED (corporate officials, workers, residents)

1. NAME	2. TITLE & TELEPHONE NO.	3. ADDRESS
Lloyd Balderston	owner (215) 644-2986	Rt. 29, Malvern, PA
King Graver	Vice President	

AR000010

Continued From Front

III. INSPECTION INFORMATION (continued)

D. GENERATOR INFORMATION (sources of waste)

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE GENERATED
Dow Chemical,			ORIGINAL (Red)
Am Chem,			
DuPont, Diamond Chemical			

E. TRANSPORTER/HAULER INFORMATION

1. NAME	2. TELEPHONE NO.	3. ADDRESS	4. WASTE TYPE TRANSPORTED
Unknown			

F. IF WASTE IS PROCESSED ON SITE AND ALSO SHIPPED TO OTHER SITES, IDENTIFY OFF-SITE FACILITIES USED FOR DISPOSAL.

1. NAME	2. TELEPHONE NO.	3. ADDRESS
N/A		

G. DATE OF INSPECTION (mo./day/yr.)	H. TIME OF INSPECTION	I. ACCESS GAINED BY: (credentials must be shown in all cases)
4/8/82	10:30-13:00	[X] 1. PERMISSION [ ] 2. WARRANT

J. WEATHER (describe)
45° F, mostly sunny

IV. SAMPLING INFORMATION

Mark 'X' for the types of samples taken and indicate where they have been sent e.g., regional lab, other EPA lab, contractor, etc. and estimate when the results will be available.

1. SAMPLE TYPE	2. SAMPLE TAKEN (mark 'X')	3. SAMPLE SENT TO:	4. DATE RESULTS AVAILABLE
a. GROUNDWATER			
b. SURFACE WATER		all organics sent to	
c. WASTE	X	Use PA Central Regional Lab,	
d. AIR		Annapolis, MD	
e. RUNOFF			
f. SPILL	X		
g. SOIL	X		
h. VEGETATION			
i. OTHER (specify)			

B. FIELD MEASUREMENTS TAKEN (e.g., radioactivity, explosivity, PH, etc.)

1. TYPE	2. LOCATION OF MEASUREMENTS	3. RESULTS
HNU readings	in drum disposal area	slight readings above background
explosimeter	in drum area	no readings above background
O_2	entire site	normal in all areas

AR000011

Continued From Page 2

ORIGINAL (Red)

IV. SAMPLING INFORMATION (continued)

C. PHOTOS

1. TYPE OF PHOTOS: [X] a. GROUND [ ] b. AERIAL

2. PHOTOS IN CUSTODY OF: Ecology & Environment, Region 3

D. SITE MAPPED?

[X] YES. SPECIFY LOCATION OF MAPS: attached

E. COORDINATES

1. LATITUDE (deg.-min.-sec.): 40°03'35"N

2. LONGITUDE (deg.-min.-sec.): 75°34'34"W

V. SITE INFORMATION

A. SITE STATUS

[ ] 1. ACTIVE (Those inductrial or municipal sites which are being used for waste treatment, storage, or disposal on a continuing basis, even if infrequently.)

[ ] 2. INACTIVE (Those sites which no longer receive wastes.)

[X] 3. OTHER (specify): allegedly inactive (Those sites that include such incidents like "midnight dumping" where no regular or continuing use of the site for waste disposal has occurred.)

B. IS GENERATOR ON SITE?

[ ] 1. NO [X] 2. YES (specify generator's four-digit SIC Code): 2869

C. AREA OF SITE (in acres): Total property-117 acres; waste site - N 2 acres

D. ARE THERE BUILDINGS ON THE SITE? [ ] 1. NO [X] 2. YES (specify): plant, storage areas

VI. CHARACTERIZATION OF SITE ACTIVITY

Indicate the major site activity(ies) and details relating to each activity by marking 'X' in the appropriate boxes.

A. TRANSPORTER		B. STORER		C. TREATER		D. DISPOSER	
1. RAIL		1. PILE		1. FILTRATION		1. LANDFILL	
2. SHIP		2. SURFACE IMPOUNDMENT		2. INCINERATION		2. LANDFARM	
3. BARGE		3. DRUMS	X	3. VOLUME REDUCTION		3. OPEN DUMP	X
4. TRUCK		4. TANK, ABOVE GROUND	X	4. RECYCLING/RECOVERY	X	4. SURFACE IMPOUNDMENT	
5. PIPELINE		5. TANK, BELOW GROUND	X	5. CHEM./PHYS./TREATMENT		5. MIDNIGHT DUMPING	
6. OTHER (specify):		6. OTHER (specify):		6. BIOLOGICAL TREATMENT		6. INCINERATION	
				7. WASTE OIL REPROCESSING		7. UNDERGROUND INJECTION	
				8. SOLVENT RECOVERY	X	8. OTHER (specify):	
				9. OTHER (specify):			

E. SUPPLEMENTAL REPORTS: If the site falls within any of the categories listed below, Supplemental Reports must be completed. Indicate which Supplemental Reports you have filled out and attached to this for..

[ ] 1. STORAGE [ ] 2. INCINERATION [ ] 3. LANDFILL [ ] 4. SURFACE IMPOUNDMENT [ ] 5. DEEP WELL

[ ] 6. CHEM/BIO/PHYS TREATMENT [ ] 7. LANDFARM [ ] 8. OPEN DUMP [ ] 9. TRANSPORTER [ ] 10. RECYCLOR/RECLAIMER

VII. WASTE RELATED INFORMATION

A. WASTE TYPE

[X] 1. LIQUID [ ] 2. SOLID [X] 3. SLUDGE [ ] 4. GAS

B. WASTE CHARACTERISTICS

[ ] 1. CORROSIVE [ ] 2. IGNITABLE [ ] 3. RADIOACTIVE [X] 4. HIGHLY VOLATILE

[X] 5. TOXIC [ ] 6. REACTIVE [ ] 7. INERT [ ] 8. FLAMMABLE

[ ] 9. OTHER (specify):

C. WASTE CATEGORIES

1. Are records of wastes available? Specify items such as manifests, inventories, etc. below.

No records available

Continued From Front

VII. WASTE RELATED INFORMATION (continued)

2. Estimate the amount (specify unit of measure) of waste by category; mark 'X' to indicate which wastes are present.

ORIGINAL (Red)

a. SLUDGE	b. OIL	c. SOLVENTS	d. CHEMICALS	e. SOLIDS	f. OTHER
AMOUNT	AMOUNT	AMOUNT 350	AMOUNT Unknown	AMOUNT	AMOUNT
UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE 55 gal. drums	UNIT OF MEASURE	UNIT OF MEASURE	UNIT OF MEASURE
[ ] (1) PAINT, PIGMENTS	[ ] (1) OILY WASTES	[X] (1) HALOGENATED SOLVENTS	[ ] (1) ACIDS	[ ] (1) FLYASH	[ ] (1) LABORATORY, PHARMACEUT.
[ ] (2) METALS SLUDGES	[ ] (2) OTHER(specify):	[ ] (2) NON-HALOGNTD. SOLVENTS	[ ] (2) PICKLING LIQUORS	[ ] (2) ASBESTOS	[ ] (2) HOSPITAL
[ ] (3) POTW		[ ] (3) OTHER(specify):	[ ] (3) CAUSTICS	[ ] (3) MILLING/MINE TAILINGS	[ ] (3) RADIOACTIVE
[ ] (4) ALUMINUM SLUDGE			[ ] (4) PESTICIDES	[ ] (4) FERROUS SMELTING WASTES	[ ] (4) MUNICIPAL
[ ] (5) OTHER(specify):			[ ] (5) DYES/INKS	[ ] (5) NON-FERROUS SMLTG. WASTES	[ ] (5) OTHER(specify):
			[ ] (6) CYANIDE	[ ] (6) OTHER(specify):	
			[ ] (7) PHENOLS		
			[ ] (8) HALOGENS		
			[X] (9) PCB		
			[ ] (10) METALS		
			[ ] (11) OTHER(specify):		

3. LIST SUBSTANCES OF GREATEST CONCERN WHICH ARE ON THE SITE (place in descending order of hazard)

1. SUBSTANCE	2. FORM (mark 'X') a. SOLID	b. LIQ.	c. VAPOR	3. TOXICITY (mark 'X') a. HIGH	b. MED.	c. LOW	d. NONE	4. CAS NUMBER	5. AMOUNT	6. UNIT
PCB	X			X				53469-21-9 11097-68-1	1350	ppm
TCE		X			X			79-01-6	13,000	ppb
tetrachloroethylene		X		X				127-18-4	22,000	ppb
phenanthrene		X		X				85-01-8		

VIII. HAZARD DESCRIPTION

FIELD EVALUATION HAZARD DESCRIPTION: Place an 'X' in the box to indicate that the listed hazard exists. Describe the hazard in the space provided.

[X] A. HUMAN HEALTH HAZARDS

Substances found in drinking wells & on-site are toxic to humans

AR000013

Continued From Page 4

VIII. HAZARD DESCRIPTION (continued)

☐ B. NON-WORKER INJURY/EXPOSURE

N/A

ORIGINAL (Red)

☐ C. WORKER INJURY/EXPOSURE

N/A

☒ D. CONTAMINATION OF WATER SUPPLY

Sample analysis revealed contamination of drinking water wells in area. (see sample analysis in MITRE model for this site)

A large supply well for Phila. Suburban Water Co. shows no contamination (from Ken Schull, Water Company).

☒ E. CONTAMINATION OF FOOD CHAIN

Potential exists -
PCB bioaccumulates

☒ F. CONTAMINATION OF GROUND WATER

Sample Analysis revealed ground water contamination

☐ G. CONTAMINATION OF SURFACE WATER

No surface water in vicinity of Chemclene

AR000014

Continue On Reverse

Continued From Front

VIII. HAZARD DESCRIPTION (continued)

☐ H. DAMAGE TO FLORA/FAUNA

Note observed

ORIGINAL (Red)

☐ I. FISH KILL

NO

☐ J. CONTAMINATION OF AIR

No readings on HNU above background

☒ K. NOTICEABLE ODORS

Next to waste pits, chemical odors were noted

☒ L. CONTAMINATION OF SOIL

Soil is stained in disposal area

☐ M. PROPERTY DAMAGE

NO

AR000015

Continued From Page 6

VIII. HAZARD DESCRIPTION (continued)

☐ N. FIRE OR EXPLOSION

NO

ORIGINAL (Red)

☒ O. SPILLS/LEAKING CONTAINERS/RUNOFF/STANDING LIQUID

Standing water on-site in drum disposal area.
Evidence of spills from drums.

☐ P. SEWER, STORM DRAIN PROBLEMS

NO

☐ Q. EROSION PROBLEMS

NO

☒ R. INADEQUATE SECURITY

At time of visit site was not fenced.
Chemclene plans to install a fence however

☐ S. INCOMPATIBLE WASTES

Unknown

AR000016

Continue On Reverse

ORIGINAL (Red)

Continued From Page 8

X. WATER AND HYDROLOGICAL DATA (continued)

LIST ALL DRINKING WATER WELLS WITHIN A 1/4 MILE RADIUS OF SITE

1. WELL	2. DEPTH (specify unit)	3. LOCATION (proximity to population/buildings)	4. NON-COMMUNITY (mark 'X')	5. COMMUNITY (mark 'X')
	See map for	location of contaminated wells	X	

I. RECEIVING WATER

1. NAME: NONE

☐ 2. SEWERS ☐ 3. STREAMS/RIVERS ☐ 4. LAKES/RESERVOIRS ☐ 5. OTHER (specify):

6. SPECIFY USE AND CLASSIFICATION OF RECEIVING WATERS

N/A

XI. SOIL AND VEGITATION DATA

LOCATION OF SITE IS IN:

☐ A. KNOWN FAULT ZONE ☐ B. KARST ZONE ☐ C. 100 YEAR FLOOD PLAIN ☐ D. WETLAND

☐ E. A REGULATED FLOODWAY ☐ F. CRITICAL HABITAT ☐ G. RECHARGE ZONE OR SOLE SOURCE AQUIFER

XII. TYPE OF GEOLOGICAL MATERIAL OBSERVED

Mark 'X' to indicate the type(s) of geological material observed and specify where necessary, the component parts.

'X'	A. OVERBURDEN	'X'	B. BEDROCK (specify below)	'X'	C. OTHER (specify below)
	1. SAND	X	Stockton Formation		
X	2. CLAY Silt Loam				
	3. GRAVEL				

XIII. SOIL PERMEABILITY

☐ A. UNKNOWN ☐ B. VERY HIGH (100,000 to 1000 cm/sec.) ☐ C. HIGH (1000 to 10 cm/sec.)

☒ D. MODERATE (10 to .1 cm/sec.) ☐ E. LOW (.1 to .001 cm/sec.) ☐ F. VERY LOW (.001 to .00001 cm/sec.)

G. RECHARGE AREA

☒ 1. YES ☐ 2. NO 3. COMMENTS:

H. DISCHARGE AREA

☐ 1. YES ☒ 2. NO 3. COMMENTS:

I. SLOPE

1. ESTIMATE % OF SLOPE: 0%

2. SPECIFY DIRECTION OF SLOPE, CONDITION OF SLOPE, ETC.: N/A

J. OTHER GEOLOGICAL DATA

- o taken from groundwater in SE, Pennsylvania (PA water Resource Rpt 2)
- o soil survey, Chester & Delaware Counties (series #19)

AR000017

VIII. HAZARD DESCRIPTION (continued)

☐ T. MIDNIGHT DUMPING

ORIGINAL (Red)

Not Apparant

☐ U. OTHER (specify):

N/A

IX. POPULATION DIRECTLY AFFECTED BY SITE

A. LOCATION OF POPULATION	B. APPROX. NO. OF PEOPLE AFFECTED	C. APPROX. NO. OF PEOPLE AFFECTED WITHIN UNIT AREA	D. APPROX. NO. OF BUILDINGS AFFECTED	E. DISTANCE TO SITE (specify units)
1. IN RESIDENTIAL AREAS	150	1/2 mi	60	350-500 ft
2. IN COMMERCIAL OR INDUSTRIAL AREAS	N/A			
3. IN PUBLICLY TRAVELLED AREAS	N/A			
4. PUBLIC USE AREAS (parks, schools, etc.)	NONE			

X. WATER AND HYDROLOGICAL DATA

A. DEPTH TO GROUNDWATER (specify unit)	B. DIRECTION OF FLOW	C. GROUNDWATER USE IN VICINITY
50 ft	NE	drinking water
D. POTENTIAL YIELD OF AQUIFER	**E. DISTANCE TO DRINKING WATER SUPPLY (specify unit of measure)**	**F. DIRECTION TO DRINKING WATER SUPPLY**
—	350 ft	SW

G. TYPE OF DRINKING WATER SUPPLY

☐ 1. NON-COMMUNITY < 15 CONNECTIONS ☒ 2. COMMUNITY (specify town): > 15 CONNECTIONS Phila. Suburban Water Co. has well here

☐ 3. SURFACE WATER ☒ 4. WELL

Continue On Page 9

Continued From Front

XIV. PERMIT INFORMATION

List all applicable permits held by the site and provide the related information.

A. PERMIT TYPE (e.g., RCRA, State, NPDES, etc.)	B. ISSUING AGENCY	C. PERMIT NUMBER	D. DATE ISSUED (mo., day, & yr.)	E. EXPIRATION DATE (mo., day, & yr.)	F. IN COMPLIANCE (mark 'X') 1. YES	2. NO	3. UNKNOWN
No permits for disposal							

XV. PAST REGULATORY OR ENFORCEMENT ACTIONS

☐ NONE ☒ YES (summarize in this space)

Consent order with PA-Der
-Contact Bruce Beitler (215) 631-2413

NOTE: Based on the information in Sections III through XV, fill out the Tentative Disposition *(Section II)* information on the first page of this form.

SECTION 4

Sect 4

SAMPLE DATA SUMMARY

Site Name: Chemclene
TDD No.: F3-8203-09
EPA No.: PA-322
Date of Sample: 4/8/82

☒ ORGANIC
☐ INORGANIC
} COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ppb = ug/l - L (aqueous); ppb = ug/kg - S (solid)

(For tentatively identified compounds see Analytical Data Sheets in the appendixes)

Sample I.D. No. Types and Location		Element/Compound Name: BIS (2-ethylhexyl) phthalate	2,4-Dimethyl phenol	1,2,4-trichloro benzene	4-chloro-3-methyl phenol	TCE	tetrachloro ethylene	ε DC	Toluene	Comments: CCl4	1,1,1-trichloroethane
Sample Blank											
Lab Blank											
stained soil #1, S-1						6500	12000	91	2300		2900
cooled liquid, S-2						1700	22000	13	350	14	820
stained soil #2, S-3				9800	12,000	28	570		18		20
waxy substance, S-4		210,000	5500			13000	1300		460		

SECTION 5

· Sect - 4

SAMPLE DATA SUMMARY

Site Name: Chemiclene Corporation
TDD No.: F3-8203-09
EPA No.: - PA-322
Date of Sample: 4/8/82

☒ ORGANIC
☐ INORGANIC
} COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ug/l - L (aqueous)
ug/kg- S (solid)

Element/Compound Name

Sample I.D. No. Types and Location	Fluoranthene	Pyrene	phenanthrene	Isophrone	Naphthalene	Chrysene	Phenol	PCB 1254 *1242
Sample Blank								
Lab Blank								
stained soil #1, S-1	3500	2200	8200					1,350,000
pooled liquid, S-2				109				
sed soil #2, S-3			26,000		4200	6400		*645,000
waxy substance, S-4					19,000		15,000	

ECOLOGY AND ENVIRONMENT, INC.
TOXICOLOGICAL ASSESSMENT
SITE: Chemclene Corporation
TDD NO.: F3-8203-09
EPA NO.: PA-322
DATE: 6/16/92

Based on review of Background Information, Site Observations and Laboratory Analytical Data, the following conclusions are indicated:

☐ There is no indication of an imminent or severe adverse toxicological impact to public health or the environment.

☐ There are possible indication(s) of potential adverse toxicological and/or environmental impact. A more compreshensive Site Investigation and Sampling Program is recommended.

☒ A review of the information presented herein is sufficient to indicate a potential adverse impact on human health and/or the environment. A Toxicological Impact Assessment is advised.

Comments:

-Concentrations up to 1330.0 ug/l of TCE have been found in previous sampling of home wells around Chemclene. Chemclene has provided carbon filters to residences whose wells are contaminated. Soils on-site contain high concentrations of PCB's (1,350,000 ug/l). This area was not fenced in as of the inspection date.

Due to the carcinogenicity of TCE and the concentrations found in the drinking wells, a toxicological impact assessment will be written for this site.

Greg Gotall

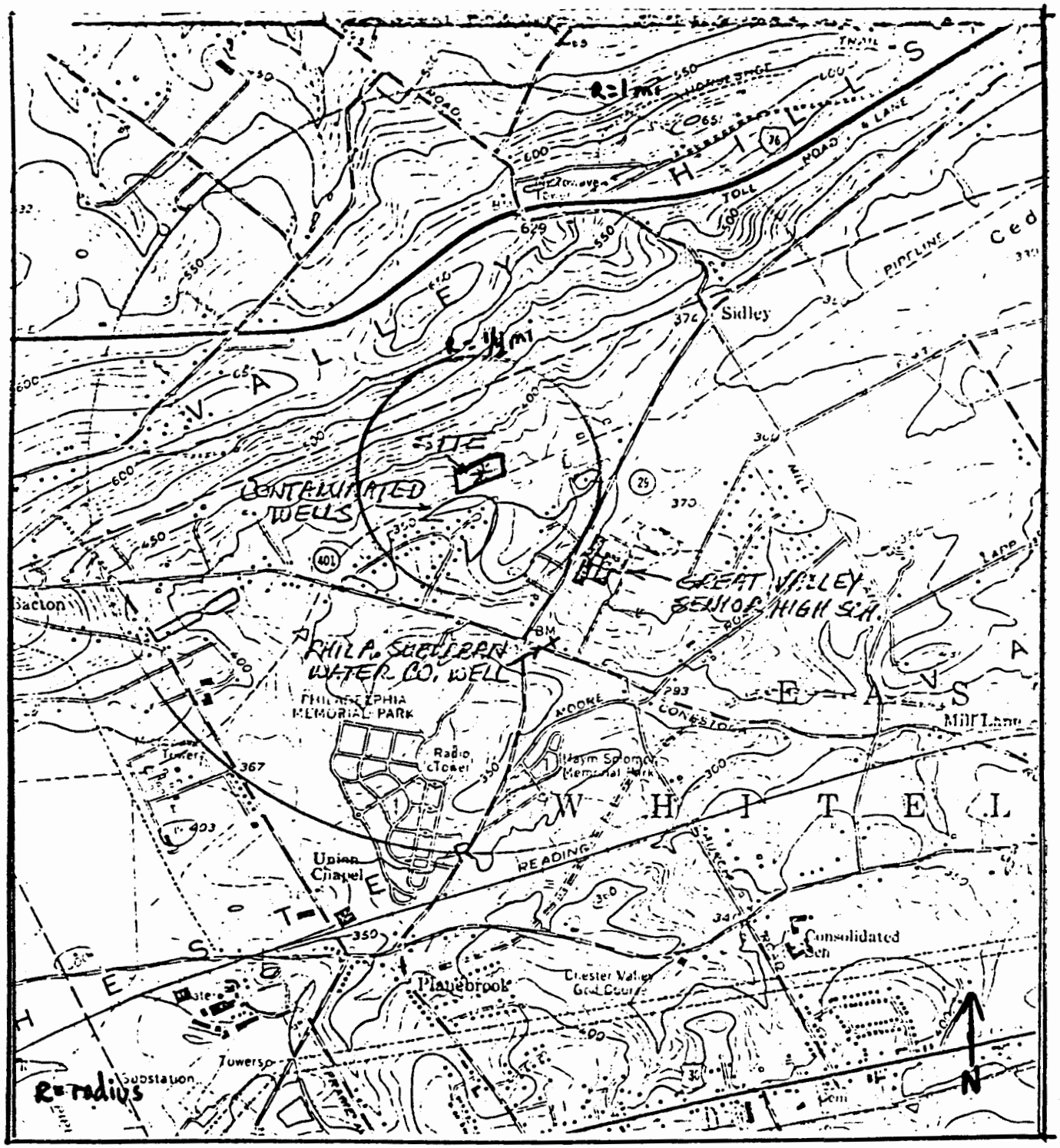
Kenneth G. Symms

Kenneth G. Symms, Ph.D., Toxicologist

recycled paper

SECTION 6

SITE NAME: Chemclene Corporation
TDD NO.: F3-9203-09
EPA NO.: PA-322
TITLE: map of Floodplain
FIGURE NO. 1

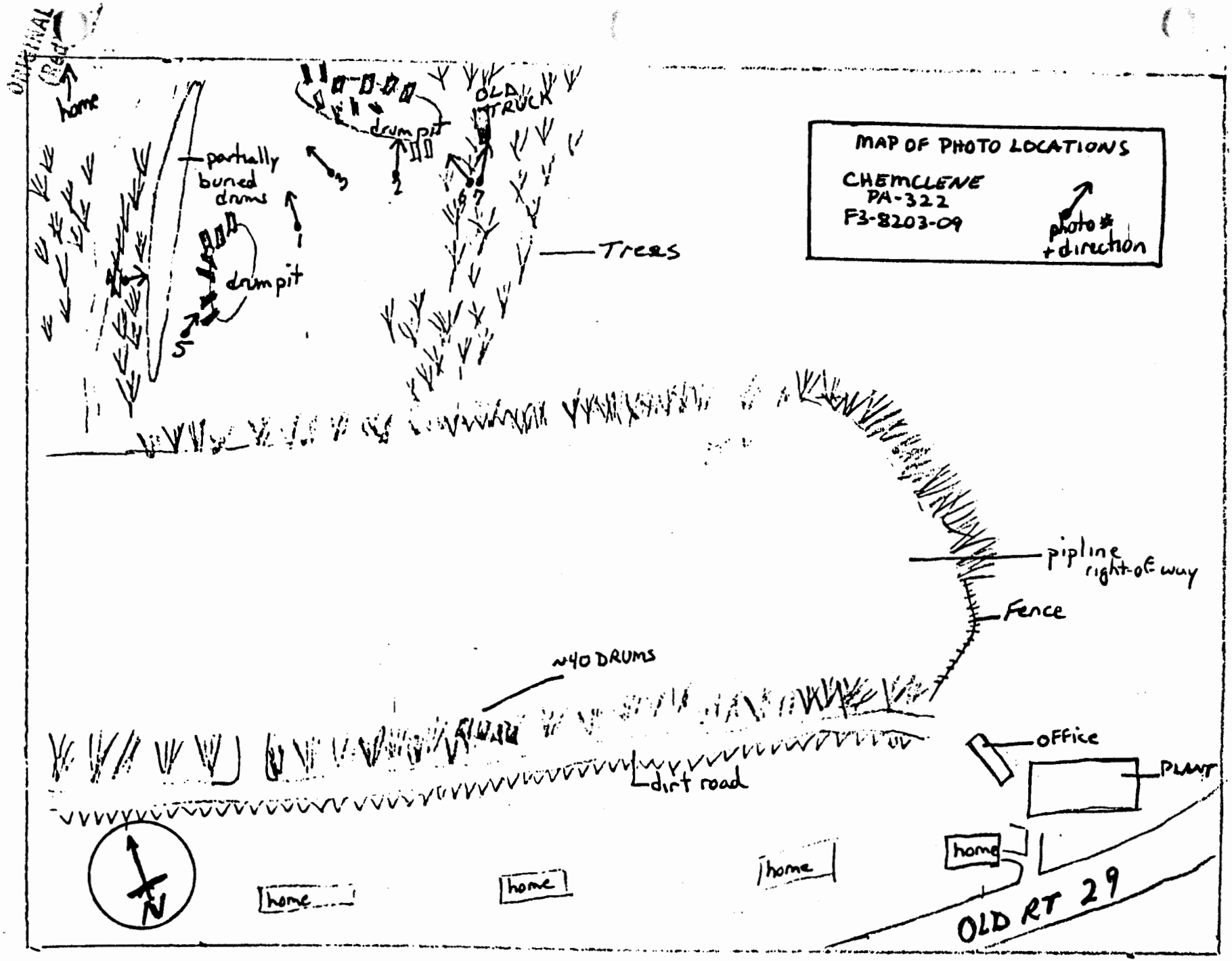


SOURCE: USGS 7.5' Floodplain Maps, MALVERN, PA

SCALE: 1:24,000

AR000026

SECTION 7



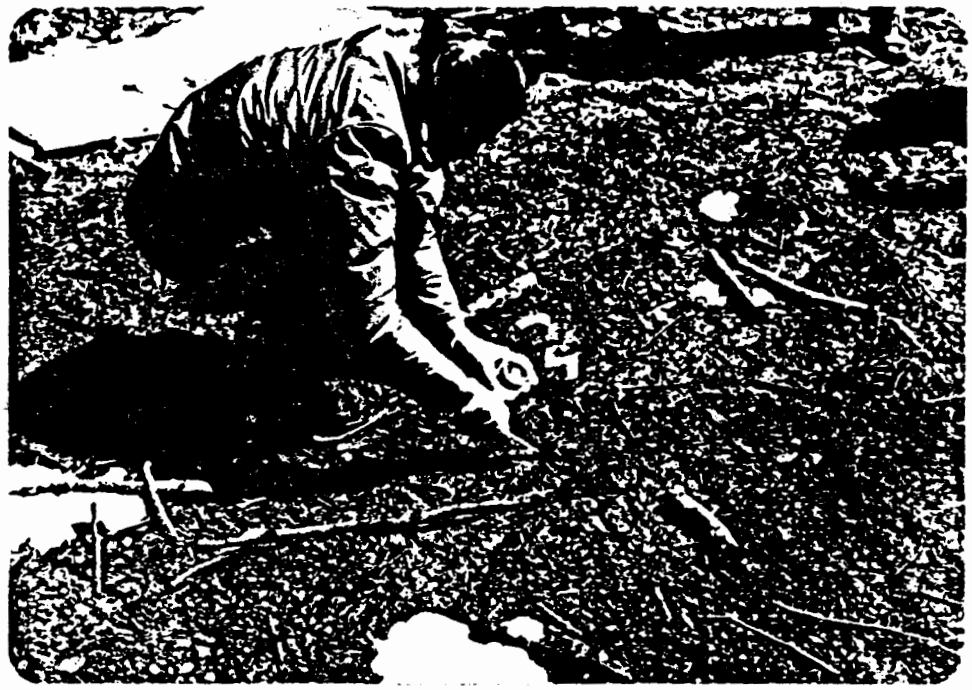
SITE SKETCH OF:

CHEMCLENE
F3-8203 , PA-322

Chemclene Corporation
TDD No. F3-8203-09
EPA No. PA-322

ORIGINAL (Red)

PHOTOGRAPHIC LOG



Photograph 1 - Sampling stained soil #1

Photograph 2 - Sampling pooled w

#1

Chemclene
PA-322
FB-8203-09

Sampling stained soil #1

10:40
4/8/82

Gregg Cupstill

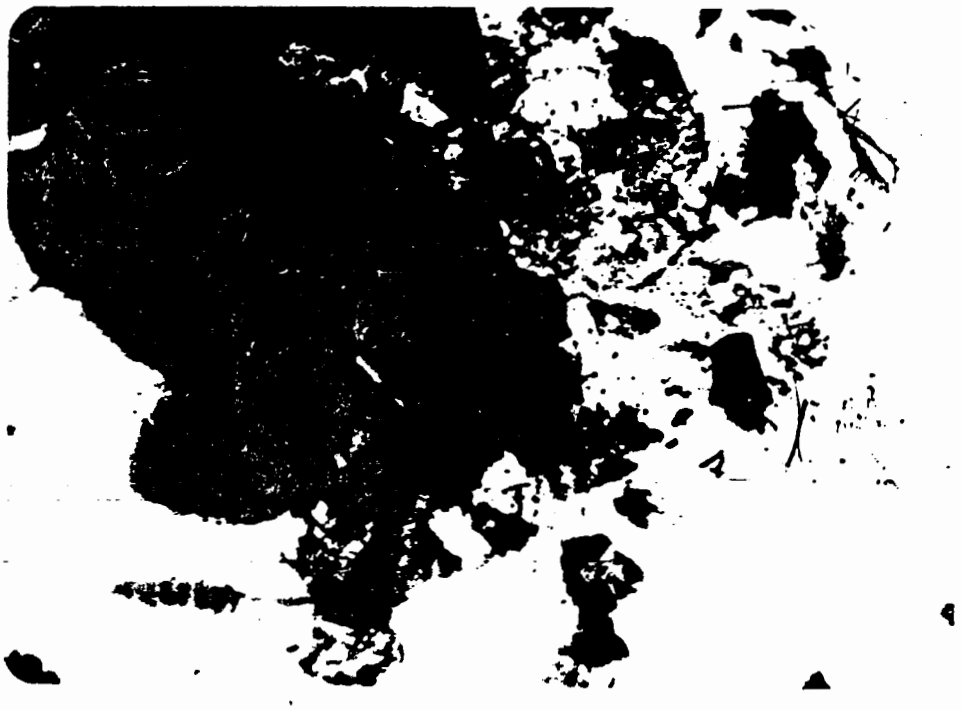
#2

Chemclene
PA-322
FB-8203-09

Sampling pooled water in drum pit area

10:55
4/8/82

Gregg Cupstill



Photograph 3 - Sampling stained soil #2

Photograph 4 - Sampling waxy substance from drum

Chemclene
PA-322
F3-8203-09

#3

Sampling Stained Soil #2

10:58
4/2/82

Gregg Capstaff

Chemclene

#4

Photograph 5 - 1 of the 2 drum pit areas

Photograph 6 - Partially burried drums near drum pit

#5 Chemclene
FX-8253-09
FA-322

1 of the 2 drum pit areas.

11:50
4/7/82

Gregg Crystall

#6 Chemclene
FX-8253-09
FA-322

Partially buried drums near drum pit.

11:05
4/7/82

Gregg Crystall

Photograph 7 - Partially burried drums near drum pit

#7 Chlordane
F3-[illegible]-09
FA-322

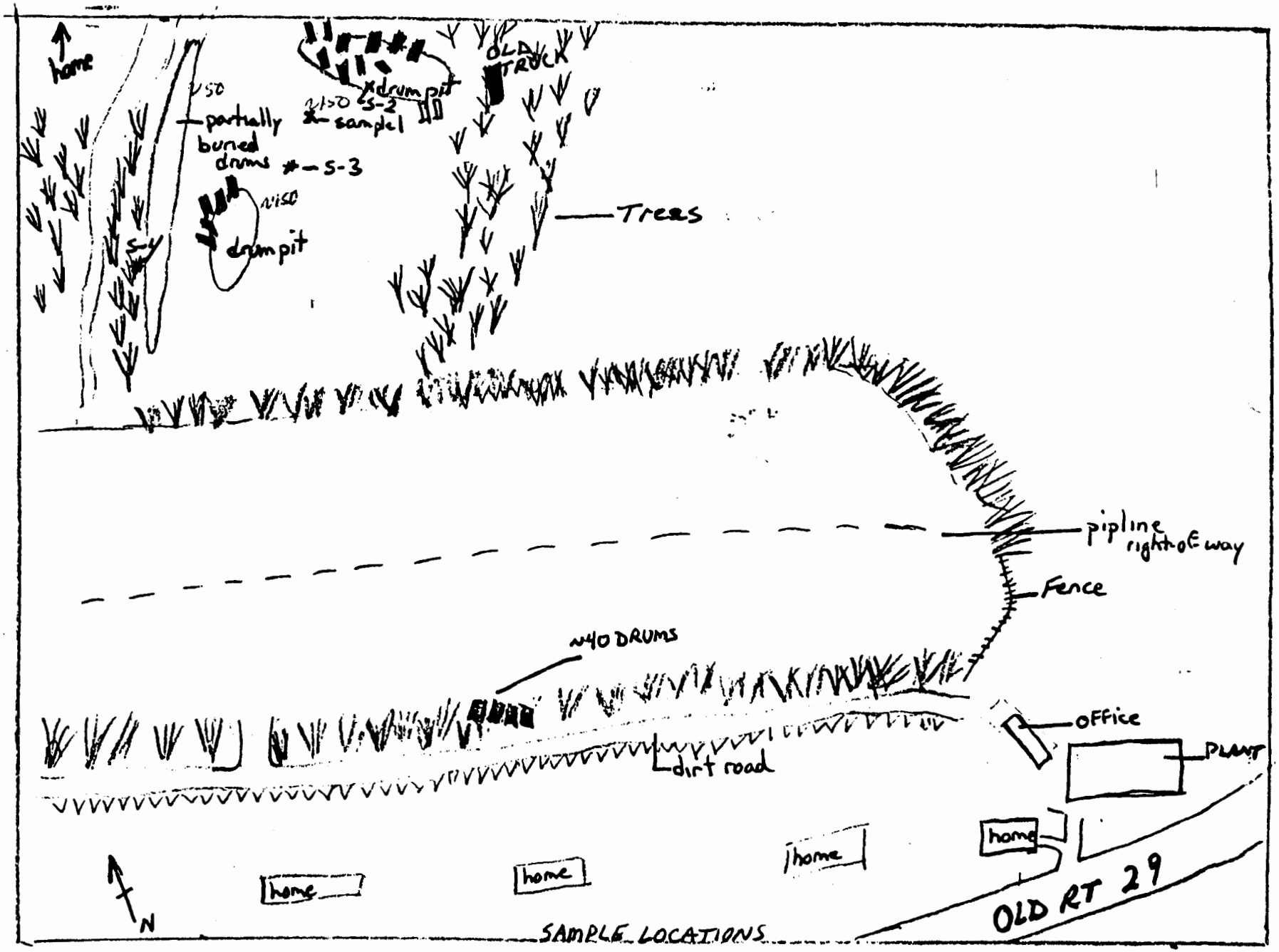
[illegible]

Partially [illegible] [illegible]
[illegible]

[illegible]

AR000036

SECTION 8



SITE SKETCH OF:

C[illegible]MCLENE

F3-820[illegible]09 PA-322

ORIGINAL
(Red)

APPENDIX 8.1

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401

301-224-2740
FTS-922-3752

ORIGINAL (Red)

DATE : May 11, 1982

SUBJECT: Chemclene; Superfund; VOA's by GC/MS
820409-05 - 09. (4/20/82 - 5/11/82)

FROM: : Rick Dreisch RD
Chemist

TO: : Daniel K. Donnelly
Chief, Lab Section

THRU : John Austin JA
Team Leader, Organic Analysis Unit

The above samples were analyzed by Purge and Trap, GC/MS for volatile organic material. Table #1 lists the samples and CRL identification sample numbers. The nominal detection limit was approximately 20 ppb. The values are reported in parts per billion (ng/g).

Table 1

Sample No.	Identification
820409-05	Chemclene, Lock Haven, PA - Sample Blank
-06	Chemclene, Lock Haven, PA - Stained Soil #1, #2
-07	Chemclene, Lock Haven, PA - Pooled Liquid, #3
-08	Chemclene, Lock Haven, PA - Stained Soil #2, #4
-09	Chemclene, Lock Haven, PA - Waxy Substance, #5

RD:ad

cc: P. J. Krantz
QAO, CRL

Compounds found: 820409-	06	07	08	09 ng/g
Methylene Chloride	840	180	520	--
Trichloroethylene	6500	1700	28	13000
1,1,1-Trichloroethane	2900	820	20	--
Toluene	2300	350	18	460
Tetrachloroethylene	12000	22000	570	1300
Ethyl Benzene	1100	--	6.8	400
Benzene	45	--	--	--
1,1,2,2-Tetrachloroethane	--	--	--	360
Chloroform	--	12	--	--
1,1-Dichloroethane	29	62	--	--
1,1-Dichloroethylene	91	12	--	--
Carbon Tetrachloride	--	14	--	--
1,1,2-Trichloroethane	--	300	--	41
Xylene isomer	1000-10000	--	100-1000	1000-10000
Xylene isomer	1000-10000	1000-10000	10-100	1000-10000
Substituted Benzene	1000-10000	--	10-100	10-100
Propyl Benzene	--	--	10-100	100-1000
1,3,5-Trimentyl Benzene	1000-10000	100-1000	100-1000	100-1000
Ethyl Methyl Benzene isomer	1000-10000	10-100	100-1000	100-1000
Ethyl Methyl Benzene isomer	100-1000	100-1000	100-1000	100-1000
Decane	100-1000	--	100-1000	100-1000
Trimethyl Benzene isomer	100-1000	--	100-1000	100-1000
Unknown Alkane (71)	--	--	10-100	--
Unknown Alkane (57)	--	--	100-1000	100-1000
Trimethyl Benzene isomer	--	100-1000	100-1000	100-1000
Substituted Cyclohexane isomer	--	10-100	10-100	--
2,3-Dihydro Indene?	--	10-100	10-100	--
1,4-Dietnyl Benzene	1000-10000	100-1000	100-1000	--
Substituted Benzene ($C_{10}H_{14}$)	--	10-100	100-1000	100-1000
Substituted Benzene ($C_{10}H_{14}$)	100-1000	--	10-100	--
Ethyl Dimethyl Benzene isomer	--	--	100-1000	100-1000
Substituted Benzene ($C_{10}H_{14}$)	--	--	100-1000	--
Substituted Benzene ($C_{10}H_{14}$)	1000-10000	10-100	100-1000	100-1000
Undecane	--	--	100-1000	100-1000
Substituted Benzene	--	--	10-100	10-100
Substituted Benzene	--	--	100-1000	10-100
Substituted Benzene	--	--	100-1000	10-100
Substituted Benzene ($C_{11}H_{16}$)	--	--	10-100	--
Substituted Benzene ($C_{11}H_{16}$)	--	--	100-1000	--
Substituted Benzene ($C_{10}H_{14}$)	--	--	100-1000	100-1000
Trichlorobenzene isomer	--	--	100-1000	--
Naphthalene or Azulene	--	--	100-1000	100-1000
Trichlorobenzene isomer	--	--	10-100	--
Acetone	100-1000	10-100	--	10-100
2-Butanone	--	10-100	--	--
cis-1,2-Dichloroethylene	10-100	100-1000	--	--
4-Methyl-2-Pentanone (MIBK)	100-1000	100-1000	--	--
1,1,1,2-Tetrachloroethane	--	10-100	--	100-1000
Unknown (73)	--	10-100	--	--
Substituted Benzene	--	10-100	--	--
Chloroethyne?	1-10	--	--	10-100
Dichloroethyne?	--	--	--	10-100

ORIGINAL (Red)

Compounds found: (Con't) 820409-	06	07	08	09 r
1,2,3-Trichloropropane	--	--	--	10-100
Pentachloroethane	--	--	--	100-1000
Substituted Benzene	--	--	--	100-1000
Substituted Benzene	100-1000	--	--	100-1000
1,1,2-Trichloro-1,2,2-Trifluoroethane	10-100	--	--	--
2-Methyl Pentanone?	10-100	--	--	--
Unknown Alkane (57)	10-100	--	--	--
Hexane	100-1000	--	--	--
Methyl Cyclopentane	100-1000	--	--	--
Cyclohexane	100-1000	--	--	--
Unknown (85)	100-1000	--	--	--
Unknown (56)	10-100	--	--	--
3-Methyl Hexane?	100-1000	--	--	--
cis-1,3-Dimethyl Cyclopentane	100-1000	--	--	--
1,1-Dimethyl Cyclopentane	100-1000	--	--	--
trans-1,3-Dimethyl Cyclopentane	100-1000	--	--	--
Methyl Cyclohexane	1000-10000	--	--	--
Unknown Alkane (57)	10-100	--	--	--
Ethyl Cyclopentane	100-1000	--	--	--
Unknown (70)	10-100	--	--	--
Unknown Alkane (57)	100-1000	--	--	--
Unknown Alkane (114)	100-1000	--	--	--
Dimethyl Cyclohexane isomer	100-1000	--	--	--
Dimethyl Cyclohexane isomer	100-1000	--	--	--
Unknown Alkane (85)	1000-10000	--	--	--
Dimethyl Cyclohexane isomer	100-1000	--	--	--
Unknown Alkane (57)	100-1000	--	--	--
2,4-Dimethyl Heptane	100-1000	--	--	--
Unknown Alkane (57)	1000-10000	--	--	--
Ethyl Cyclohexane	1000-10000	--	--	--
Substituted Cyclohexane isomer	100-1000	--	--	--
Unknown (97)	100-1000	--	--	--
Unknown (84)	10-100	--	--	--
Unknown (97)	100-1000	--	--	--
Trimethyl Cyclohexane isomer	1000-10000	--	--	--
Unknown Alkane (84)	1000-10000	--	--	--
Unknown Alkane (70)	100-1000	--	--	--
Unknown Alkane	1000-10000	--	--	--
Unknown Alkane (57)	1000-10000	--	--	--
Unknown Alkane (57)	100-1000	--	--	--
Trimethyl Cyclohexane isomer	100-1000	--	--	--
Unknown (57)	100-1000	--	--	--
Unknown (121)	100-1000	--	--	--
Unknown (93)	100-1000	--	--	--
Unknown (125)	1000-10000	--	--	--
Ethyl Methyl Cyclohexane isomer	1000-10000	--	--	--
Ethyl Methyl Cyclohexane isomer	1000-10000	--	--	--
Nonane	1000-10000	--	--	--
Unknown Alkane ($C_{10}H_{20}$)	100-1000	--	--	--
Unknown (125)	1000-10000	--	--	--
Unknown (97)	1000-10000	--	--	

ORIGINAL (Red)

Compounds found: (Con't)

820409-	06	07	08	09 ng/g
Unknown Alkane (57)	1000-10000	--	--	--
unknown ($C_{10}H_{16}$)	100-1000	--	--	--
Unknown (82)	1000-10000	--	--	--
Unknown (97)	100-1000	--	--	--
Unknown ($C_{10}H_{16}$)	100-1000	--	--	--
Unknown (93)	1000-10000	--	--	--
Unknown (95)	100-1000	--	--	--
Unknown (55)	100-1000	--	--	--
Unknown (57)	1000-10000	--	--	--
Unknown (93)	1000-10000	--	--	--
Unknown Alkane (57)	1000-10000	--	--	--
Unknown (69)	1000-10000	--	--	--
3-Methyl Nonane?	100-1000	--	--	--
Unknown (97)	100-1000	--	--	--
(1S,3S)-(+)-m-Methane	100-1000	--	--	--
Unknown ($C_{10}H_{18}O$?)	1000-10000	--	--	--
Unknown (134)	100-1000	--	--	--
Unknown (119)	1000-10000	--	--	--
3-Methyl Decane	100-1000	--	--	--
1,3,3-Trimethyl Bicyclo[2.2.1] Heptane-2-one?	1000-10000	--	--	--
Unknown (152)	1000-10000	--	--	--
Substituted Cyclohexane?	100-1000	--	--	--
Substituted Benzene?	100-1000	--	--	--
Dodecane?	100-1000	--	--	--
Unknown ($C_{10}H_{18}$)	100-1000	--	--	--

820409-06 Stained Soil #1, #2

ORIGINAL (Red)

Priority Pollutants	ppm (µg/gm dry)
Fluoranthene	<10 (3.5)
Pyrene	<10 (2.2)
Phenanthrene	<10 (8.2)

Other Compounds Tentatively Identified

Dimethylbenzene isomer	10-100
Dimethylbenzene isomer	10-100
Nonane	100-1000
2,6,6-Trimethylbicyclo[3.1.1]hept-2-ene	10-100
2,2-Dimethyl-3-methylene-bicyclo[2.2.1]heptane	10-100
3-Ethyl-2-methyl-heptane	10-100
(1S,3S)-(+)-m-menthane	10-100
7-Methyl-3-methylene-1,6-octadiene	10-100
Trimethylbenzene isomer	10-100
Decane	10-100
1,7,7-Trimethyl-tricyclo[2.2.1.$0^{2,6}$]heptane	10-100
1-Methyl-3-(1-methylethyl)-benzene	100-1000
1-Methyl-4-(1-methylethenyl)-(R)-cyclohexene	100-1000
1,3,3-Trimethyl-bicyclo[2.2.1]heptan-2-one	10-100
Undecane	10-100
Hydrocarbon (Best Match - 2,5-Dimethyloctane)	10-100
Hydrocarbon (Best Match - Undecane)	10-100
Hydrocarbon (Best Match - 2,6-Dimethyloctane)	10-100
Hydrocarbon (Best Match - Undecane)	10-100
2,6,10,14-Tetramethylheptadecane	10-100
Pentadecane	100-1000
Hexadecane	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Heptadecane)	100-1000
2,6,10,14-Tetramethylpentadecane	100-1000
Hydrocarbon (Best Match - Octadecane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000

The presence of pentachlorobipenyls and hexachlorobiphenyls below the limits of this method was also indicated. Additional analysis by electron capture gas chromotography for polychlorinated biphenyls (PCBs) was ordered.

820409-07 Pooled Liquid, #3

ORIGINAL (Red)

Base/Neutral Extract

Priority Pollutants	µg/L
Isophrone	109

Other Compounds Tentatively Identified	µg/L (ppb)
4-Methyl-2-pentanone	10-100
Toluene	100-1000
4-Hydroxy-4-methyl-2-pentanone	100-1000
Ethyl-benzene	<10
Cyclohexane	10-100
Dimethylbenzene isomer	10-100
Ethyl-methylbenzene isomer	<10
Trimethylbenzene isomer	<10
Ethyl-methylbenzene isomer	<10
Benzenemethanol	<10
2,4,6-Trimethyloctane	<10
Tridecane	10-100
N-butyl-benzenesulfonamide	10-100
Hydrocarbon (Best Match - Tridecane)	10-100

Acid Extract

Priority Pollutants

None detected >10 ppb

Other Compounds Tentatively Identified	
Methylphenol isomer	10-100

820409-08 Stained Soil #2, #4

Priority Pollutants	ppm (µg/gm dry)
4-Chloro-3-methylphenol	12
1,2,4-Trichlorobenzene	<10 (9.8)
Naphthalene	<10 (4.2)
Phenanthrene	26
Chrysene	<10 (6.4)

Other Compounds Tentatively Identified	
Hexanal	10-100
Hydrocarbon (Best Match - 3,4-Dimethyl-heptane)	<10
Ethyl-9-methylbenzene isomer	10-100
Ethyl-methylbenzene isomer	<10
1,2,4-Trimethylbenzene	10-100
Decane	10-100
S-ethyl-2-methylheptane	10-100
Ethyl-methylbenzene isomer	10-100
Methyl-propylbenzene isomer	<10
Undecane	100-1000
1,2,4,5-Tetramethylbenzene	<10
2-Ethyl-1-hexanol	10-100
Dodecane	10-100
2,6-Dimethylundecane	10-100
Trichlorobenzene isomer	<10
2,6-Dimethyloctane	10-100
1,3-Isobenzofurandione	100-1000
1,3-Diisocyanatomethylbenzene	10-100
2,7-Dimethyloctane	10-100
Undecane	<10
Pentadecane	100-1000
Hexadecane	100-1000
Heptadecane	1000-10000

820409-09 Waxy Substance, #5

Priority Pollutants	ppm (µg/gm)
Phenol	15
2,4-Dimethylphenol	<10 (5.5)
Naphthalene	19
Bis(2-ethylhexyl)phthalate	210

Other Compounds Tentatively Identified	
Toluene	10-100
Ethylbenzene	100-1000
Dimethylbenzene isomer	100-1000
Dimethylbenzene isomer	100-1000
Nonane	100-1000

820409-09 Waxy Substance, #5 (Con't)

Other Compounds Tentatively Identified (Con't)	ppm (µg/gm)
1,1,2,2,-Tetrachloroethane	10-100
Cyclopropylcyclohexane	10-100
Propylcyclohexane	10-100
2,6-Dimethyloctane	100-1000
3-Ethyl-2-methyl-heptane	10-100
Propylbenzene	10-100
1-Ethyl-2-methylbenzene	10-100
(2-Methylpropyl)-cyclohexane	100-1000
1,2,3-Trimethylbenzene	100-1000
Decane	100-1000
4-Methyldecane	100-1000
1-Methyl-2-propylbenzene	10-100
2,5-Dimethyl-nonane	10-100
2-Methyl-decane	100-1000
Ethyl-dimethylbenzene isomer	10-100
Undecane	100-1000
2,5-Dimethyl-nonane	10-100
4-Methyl-undecane	10-100
3-Ethyl-2-methyl-heptane	10-100
Dodecane	100-1000
Hydrocarbon (Best Match - 3-Ethyl-2-heptane)	10-100
Tridecane	10-100
Methylnaphthalene isomer	10-100
Methylnaphthalene isomer	<10
2,6-Dimethyloctane	10-100
Hydrocarbon (Best Match - Undecane)	10-100
Dimethylnaphthalene isomer	<10
4,8-Dimethylundecane	10-100
Hydrocarbon (Best Match - Undecane)	10-100
Hydrocarbon (Best Match - Undecane)	10-100
Hydrocarbon (Best Match - 2,6,10,14-Tetramethyl-pentadecane)	10-100
Hydrocarbon (Best Match - Octadecane)	10-100
Hydrocarbon (Best Match - 5-propyl-tridecane)	10-100
Hydrocarbon (Best Match - Octadecane)	10-100
Hydrocarbon (Best Match - Eicosane)	10-100
Hydrocarbon (Best Match - Heneicosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	1000-10000
Hydrocarbon (Best Match - Tricosane)	1000-10000
Hydrocarbon (Best Match - Eicosane)	1000-10000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Tricosane)	1-10%
Hydrocarbon (Best Match - Eicosane)	10-100
Hydrocarbon (Best Match - Pentacosane)	10-100
Hydrocarbon (Best Match - Tricosane)	100-1000
Hydrocarbon (Best Match - Tricosane)	1-10%
Hydrocarbon (Best Match - Pentacosone)	10-100
Hydrocarbon (Best Match - Eiscosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Tricosane)	1-10%

ORIGINAL

820409-09 Waxy Substance, #5 (Con't)

Other Compounds Tentatively Identified (Con't)	ppm (µg/gm)
Hydrocarbon (Best Match - pentacosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	10-100
Hydrocarbon (Best Match - Eicosane)	1000-10000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	10-100
Hydrocarbon (Best Match - Tricosane)	1000-10000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	1000-10000
2,6,10,14-Tetramethyl-Pentadecane	100-1000
Hydrocarbon (Best Match - Octadecane)	100-1000
Hydrocarbon (Best Match - Octadecane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Heneicosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Octandecane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Pentasosane)	100-1000
Hydrocarbon (Best Match - Pentacosane)	100-1000
Hydrocarbon (Best Match - Eicosane)	1000-10000
Eicosylcyclohexane	10-100
Hydrocarbon (Best Match - Eicosane)	100-1000

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
CENTRAL REGIONAL LABORATORY
839 BESTGATE ROAD
ANNAPOLIS, MARYLAND 21401

301-224-2740
FTS-922-3752

DATE : May 16, 1982

SUBJECT: Chemclene, Superfund: 82040906, 08, 09

ORIGINAL (Red)

FROM: : James Jerpe JJ
Chemist

TO: : Daniel K. Donnelly
Chief, Lab Section

THRU : John Austin JA
Team Leader, Organic Analysis Unit

Samples were examined for the presence of "priority pollutant" pesticides and PCB's.

Sample extracts were chromatographed on a 3% OV-1 glass column at 185°C using electron-capture detection. Known concentrations of authentic standards were chromatographed under the sample conditions whereby relative retention times were compared to the elution of standard. PCB's were found at detectable limits.

Table one is a description of the source of each sample and concentration in parts per million.

Table two is a list of standards whose relative retention times were compared with samples and the lowest detection limit for each compound.

Table One

Sample #	Description	Concentration ppm	
820409-06	Stained Soil #1, #2	1,350	PCB 1254
-08	Stained Soil #2, #4	64.5	PCB 1242
-09	Wax, #5	Not Detected	

JJ:jr

~~Attach. B~~

Chemclene
F3 8203-09

Monitor Well	Elapsed Time in Minutes	1,1,1-Trichloroethane	TCE	PCE
CC-2	10	12.4	57.8	7.3
	20	13.3	62.2	7.0
	60	17.0	64.1	3.0
CC-3	30	2,080.	12,600.	1,120.
	40	2,230.	12,600.	1,170.
	60	1,690.	10.500.	885.
CC-5	5	586.	1,180.	861.
	20	627.	1,310.	904.
	30	572.	1,270.	743.

oil disposal areas

Table 2 - Results of chlorinated hydrocarbon analysis of Chemclene monitoring wells, Samples collected May 7, 1981. All results micrograms per liter.

Chemclene
PF3-8203-09

ORIGINAL (Red)

TCE Concentrations

Well No.	Concentration	Well No.	Concentration	Well No.	Concentration
1	0.0	24	N.S.	47	0.0
2	0.0	25	0.0	48	0.0 (DER)
3	0.0	26	N.S.	49	0.0
4	0.0	27	N.S.	50	0.0
5	2.5	28	N.S.	51	.5
6	32.4	29	N.S.	52	0.0
7	0.0	30	N.S.	53	0.0
8	0.0	31	N.S.	54	0.0
9	75.6	32	N.S.	55	0.0 (DER)
10	1330.0	33	N.P.	56	14.3
11	N.S.	34	N.S.	57	11.4
12	N.S.	35	1.2	58	2.9
13	N.S.	36	2.6 (DER)	59	0.0
14	N.S.	37	N.S.	60	0.0
15	27.0	38	N.S.	61	0.0
16	8.8	39	N.S.	62	N.S.
17	15.0	40	N.S.	63	0.0
18	N.P.	41	190.5	64	0.0
19	13.3	42	0.0	65	.12
20	.3	43	0.0	66	N.P.
21	N.P.	44	.5	67	.4
22	N.P.	45	0.0	68	N.D.
23	13.0	46	0.0	69	N.D.

N.S. - not sampled, not in study area or a non-flowing spring
N.P. - no pump
DER - result obtained from DER
N.D. - not drilled at the time of sampling

Results from water samples collected from wells in the vicinity of the Chemclene Corporation, Frazer, Pennsylvania. The wells were sampled May 8 and 9, 1980, and June 13, 1980, and analyzed for TCE. All results are in micrograms/liter.

ORIGINAL
(Red)

APPENDIX B.2

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

CHAIN OF CUSTODY RECORD

EPA Region 3 FIT
8021 Rt. 130
Pennsauken, NJ 08110

PROJ. NO.	PROJECT NAME
PA-322	Chemclene

SAMPLERS: (Signature) Gregg Crystall

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	VOA						REMARKS
1	—	—		X	Sample Blank	1	1						
2	4/8/82	10:40		X	stained soil #1	1	1						
3	4/8/82	10:55		X	pooled liquid	1	1						
4	4/8/82	10:58		X	stained soil #2	1	1						
5	4/8/82	11:15		X	waxy substance	1	1						
													Analyse For organic priority pollutants

AR000053

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Gregg Crystall	4/8/82 14:00				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				Shipped Via Federal Express	

ORIGINAL (Red)

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

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YOUR FEDERAL EXPRESS ACCOUNT NUMBER: 0071-6239-2

DATE: 4/8/82

(Your Name): Greg Crystall

DEPARTMENT/FLOOR NO.

COMPANY: ... ENVIRONMENTAL INC

STREET ADDRESS: ... SUITE 130

CITY / STATE: ... NJ

ZIP ACCURATE ZIP CODE REQUIRED FOR CORRECT INVOICING

AIRBILL NO. 212143481

TO (Recipient's Name): US EPA

If Hold For Pick-Up or Saturday Delivery, Recipient's Phone Number

COMPANY: Central Regional Lab

DEPARTMENT/FLOOR NO

STREET ADDRESS (P.O. BOX NUMBERS ARE NOT DELIVERABLE): 839 Bestgate Road

CITY: Annapolis

STATE: MD

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8 ☐
9 ☐

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TOTAL 1	TOTAL 50	TOTAL	

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Federal Express Corporation Employee No. 5144

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AGT/PRO

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This shipment is within the limitations prescribed for: (mark one) ☐ passenger & cargo aircraft ☐ cargo-only aircraft

No. of Pkgs.	Article No. (int'l only)	Proper Shipping Name of Materials as shown in 49 CFR, part 172.101 and additional description requirements specified in 49 CFR 172.203 and (for int'l shipments) the IATA Restricted Articles Regulations	Hazard Class Specified in 49 CFR 172.101	Identification Number (UN or NA) 172.101	IATA Packing Note No. Applied (int'l only)	Net Quantity Per Package	Flash Point (closed cup) For Flammable Liquids (int'l Only) C	F
[illegible]		[illegible]	[illegible] LIQUID	[illegible]		[illegible]		
[illegible]		[illegible]	[illegible]	[illegible]		[illegible]		
		CARGO ONLY AIRCRAFT						

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I hereby certify that the contents of this consignment are fully and accurately described above by Proper Shipping Name and are classified, packed, marked, and labelled and in proper condition for carriage by air according to applicable national governmental regulations.

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Name and title of person signing Certification [illegible]

Emergency Telephone No. [illegible]

Date [illegible]

Signature of the Shipper (see WARNING above) [illegible]

Federal Express Airbill No. [illegible] | Origin Station [illegible] | Destination Station [illegible]

[illegible]

00055

ENVIRONMENTAL PROTECTION AGENCY
Offi(Enforcement

Sample receipt, split samples

CHAIN OF CUSTODY RECORD

EPA Region 3 FIT
8021 Rt. 130
Pennsankin, NJ 08110

PROJ. NO.	PROJECT NAME
PA-322	Chemclene

SAMPLERS: (Signature)
Greg Crystall

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	8 oz jar							REMARKS
1	4/8/82	1040		X	black tarry, clay stained soil	1	1							
2	4/8/82	1055		X	pool liquid near 2nd pit	1	1							
3	4/8/82	10:58		X	black pile near pit 2	1	1							
4	4/8/82	11:15		X	waxy substance from drum	1	1							

AR000056

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Greg Stall	4/8/82 11:31	W. H. Baldwin			
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
					ORIGINAL

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FIELD INVESTIGATIONS OF UNCONTROLLED HAZARDOUS WASTE SITES

ORIGINAL (Red)

FIT PROJECT

TASK REPORT TO THE ENVIRONMENTAL PROTECTION AGENCY CONTRACT NO. 68-01-6056

A Toxicological Impact Assessment
of

ORIGINAL (Red)

Chemclene
TDD No. F3-8203-09A
EPA No. PA-322

Preparation Date: August 10, 1982

Presented to: Linda Y. Boornazian, Acting DPO
EPA Region III

Prepared by: Gregg Crystall
Gregg Crystall, Industrial Hygienist

Kenneth G. Symms
Kenneth G. Symms, Ph.D., Toxicologist

Joseph G. McGovern
Joseph G. McGovern, FITL III

ecology and environment, inc.

International Specialists in the Environmental Sciences

Chemclene
TDD No. F3-8203-09A
EPA No. PA-322

TABLE OF CONTENTS

SECTION 1

Chemclene
TDD No. F3-8203-02A
EPA No. PA-322

SUMMARY AND RECOMMENDATIONS

1.1 SUMMARY

Chemclene Corporation in Malvern, PA, a solvent reclaimer, previously disposed of drummed wastes in pits in a wooded area on their property. Chemclene is currently in negotiation with the Pennsylvania Department of Environmental Resources (PA DER) for the complete clean up of wastes on site as well as to establish a groundwater treatment/recovery program. The removal of wastes from the site is anticipated by the PA DER to be complete by the end of 1983.

Previous sampling by the State and Chemclene shows substantial amounts of TCE in domestic wells in the vicinity of Chemclene and PCE and TCE in groundwater monitoring wells on site. Chemclene has provided carbon filters to residences with contaminated wells. These filters can be beneficial but may be unreliable if not properly maintained (e.g. scheduled cartridge replacement).

Sampling by FIT Region III on April 8, 1982 revealed PCE in stained soil up to 1,350,000 ug/kg, various polynuclear aromatics up to 26,000 ug/kg, aliphatic chlorinated hydrocarbons up to 22,000 ug/kg, and benzene and substituted benzene compounds up to 2,300 ug/kg. A sample of waxy material from a drum on site showed similar compounds at various concentrations. These compounds may degrade the groundwater and possibly pose hazards from direct contact. It should be emphasized that other than TCE and PCE, no analyses to date have been done to ascertain levels of other contaminants in the groundwater (See Site Inspection Report, TDD No. F3-8203-09).

1.2 RECOMMENDATIONS

o Since there are many carcinogenic and toxic compounds on site, the domestic wells in the area should be sampled for priority pollutants to determine extent of contamination, threat of contamination and to insure potability of the water.

o Initiate steps to verify the adequacy and sustained effectiveness of the carbon filters (i.e. frequent sampling and cartridge replacement).

o Site should be enclosed to insure no direct contact with wastes.

o Monitor the State's progress in its negotiations with Chemclene.

ORIGINAL
(Red)

SECTION 2

2.1 INTRODUCTION

Chemclene Corporation located in Malvern, PA is a solvent reclaiming company in operation since 1952. Drummed liquid waste had been disposed in pits in a wooded area on Chemclene's property. Although this disposal practice ceased in 1976, extensive ground water contamination is a current problem. There are at present approximately three hundred 55-gallon drums buried and partially buried in this area. Most of the drums are empty and the soil near the drums appeared to be stained and contaminated with organic solvents as indicated by chemical odors generated during sampling of the snow covered area and confirmed by sample analyses.

The PA DER is in the process of negotiating with Chemclene for the complete clean up and proper disposal of the drum pits and contaminated soils at the facility. PA DER is anticipating the removal of all wastes from this area by the end of 1983. Chemclene is also expected to institute a groundwater recovery and treatment program as well as a groundwater monitoring program to insure that uncontaminated residential wells maintain their potability.

This report addresses the toxicological impacts of previous sampling results for TCE and PCE of groundwater and domestic wells conducted by PA DER and Chemclene initially, and on-site sampling done by FIT Region III subsequently.

2.2 ASSESSMENT OF PA DER AND CHEMCLENE SAMPLING

Previous sampling of private domestic wells and on-site monitoring wells by PA DER and Chemclene in June 1980 and July 1981 revealed substantial contamination of the underlying shallow aquifer with suspect carcinogenic chlorinated ethene and related compounds (up to 12,600 ug/l TCE and 1,170 ug/l PCE). Of 69 residences in the vicinity of the Chemclene facility 44 were sampled and 20 of these evidenced detectable concentrations of TCE which ranged between trace or <1 to 1,330 ug/l. All contaminated wells are located within 200 yards to the south of the drum disposal pits.

The estimated additional lifetime cancer risks for consuming 2 liters per day of contaminated water are 1.14 cases per million per ug/l PCE and 0.36 cases per million individuals exposed per ug/l TCE. Thus, at the upper concentrations of 12,600 ug/l TCE and 1,170 ug/l PCE found the estimated cancer risks are 4.54 and 1.33 incidences, respectively, out of 1,000 individuals exposed. The combined presence and thus risks of TCE and PCE in drinking water are additive, and the presence of other contaminants such as 1,1,1-trichloroethane may potentiate the tumorgenicity and other potential adverse effects of these carcinogenic compounds.

Noncarcinogenic chronic effects observed in animal studies suggest a dose-related decrease in survival over time and chronic nephropathy (kidney damage) in rats from TCE exposure (NCI, 1976). Based on a no-observable-effect level (NOEL) in animals (Van Duuren, et.al., 1979) a protective level with appropriate safety factors was derived to provide a criterion for TCE of 1,666 ug/day (Ambient Water Quality Criteria for Trichloroethylene, U.S. EPA, 1980).

In addition to consuming 2 L of water per day as the EPA-adopted standard, it is possible that daily prolonged showering (e.g. 20 minutes) in a confined space could result in inhalation and systemic absorption of levels of TCE that exceed amounts consumed from imbibing contamianted household water (see Toxicological Impact Assessment for Blosenski, TDD No. F3-8203-06, EPA No. PA-419, for assumptions and derivation of this estimate).

Chemclene has provided neighboring residences with activated carbon filters to remove organic contaminants from their potable supplies. There is, however, no on-going monitoring progam to assure the sustained effectiveness of this in-line treatment. Carbon filtration can effectively reduce -- but not completely eliminate -- concentrations of TCE, PCE and many other compounds

under ideal conditions. Reducing levels from micrograms per liter to nanograms per liter, however, generally requires a large carbon dose and a relatively long contact time. Thus, reduction to subtrace levels of these specific organics of health concern is more difficult than would normally be expected and depends largely on numerous variables such as flow rate, pH, and the presence of other compuonds. Moreover, breakthrough or sudden release of these contaminants can occur without warning depending on influent concentration, fluctuations in concentration, flow demand, other contaminatns, and other indeterminant factors. These filtration devices, therefore, while providing a substantial benefit may not be sufficiently reliable as a means of protecting the affected populace from exposure to these potential carcinogens. Finally, exposure routes other than filtered drinking water may be of significance with respect to the volatile chlorinated compounds, as discussed above.

2.3 ASSESSMENT OF FIT SAMPLING

Sampling by FIT Region III (April 8, 1982) of stained soils, drum contents, and standing water from a drum pit revealed substantial on-site contamination by a variety of compounds of toxicological concern. PCE and TCE, which were the only compounds examined by PA DER and Chemclene in groundwater analyses, were found in all surface samples collected by FIT Region III. Levels up to 22,000 ug/l PCE were detected in a sample taken from pooled liquid at the base of a drum pile, and 13,000 ug/l TCE was reported as a constituent of a waxy substance taken from a drum (See Sample Data Summary).

In addition, substantial amounts of potentially carcinogenic PCBs were identified in samples taken from stained soils which encompassed rather large areas (roughly 1,000 square feet). PCB-1254 was detected at levels of 1,350,000 ug/kg in one soil sample and PCB-1242 at a level of 64,500 in another soil sample. The toxicological concern with respect to PCBs is dominated by their carcinogenic potential in humans. These compounds are extraordinarily

stable and persistent in the environment. Bioaccumulation and biomagnification due to the highly lipophilic properties of PCBs render these compounds particularly likely to eventually enter the biosphere and food chain. PCBs are readily absorbed through the skin.

Potentially carcinogenic plasticizing agent di-ethylhexylphthalate (DEHP) was also detected in a wax-like substance taken from a drum at a level of 210,000 ug/kg. Acute hazards from exposures to the PCBs and phthalates are of fairly low order. These compounds have a strong affinity for humic elements in soil and their migration in ground waters is highly limited relative to other priority pollutants such as TCE and PCE which are highly mobile.

Chlorinated aliphatic hydrocarbons are often times forerunners of other compounds in groundwater. The polynuclear aromatic hydrocarbons (PAH) found in spills on site (See Data Summary Sheets) are less mobile but could migrate in groundwater and further degrade potable fields. Chrysene (6,400 ug/l) flouranthene (3,500 ug/l), phenanthrene (26,000 ug/kg) and pyrene (2,200 kg) were found in stained soil near the drum pits. The drinking water standard for PAH as a class has been developed by the World Health Organization in 1970 as 0.2 ug/l. Chrysene is an experimental carcinogen and very toxic via dermal and inhalation routes. Phenanthrene is an experimental carcinogen.

Isophrone found at 109 ug/kg in stained soil on site is moderately toxic via dermal, oral and inhalation routes (although its vapor pressure is low and does not readily volatilize). It is irritating to humans at 25 ppm (Sax, 1979). Isophrone is primarily a hepatotoxin and considered one of the most toxic ketones.

Carbon tetrachloride was found in pooled liquid in the drum pit at 14 ug/l. Since CCl_4 is a suspect carcinogen its ambient water concentration should be zero. At 14 ug/l, assuming 2 L of water is consumed daily, the

incremental increase of cancer risk over a lifetime would be 3.72×10^{-5} (EPA 440/5-80-026/A80). Both inhalation and ingestion of CCl_4 effect the liver causing centralobular necrosis and fatty liver. CCl_4 is also readily absorbed through the skin. Acute, subchronic and chronic poisonings have been produced by all routes of absorbtion of CCl_4.

Phenol and 2,4-dimethyl phenol were detected in waxy substance in the drum at 15,000 ug/kg and 5,500 ug/kg, respectively. 2,4-Dimethylphenol is moderately toxic via ingestion and an experimental carcinogen. Although phenol is absorbed through the skin, the concentration detected in the drum is relatively low and the hazards posed by exposure are not significant with regard to phenol. Solutions of 1% phenol (10,000,000 ug/l) have been used as a topical ointment to stop itching. Phenol is extremely toxic via ingestion as 1.0 g taken orally has caused fatality (Patty, 1981).

Note: The appearance of these compounds in ground water could represent a serious threat to human health. Analyses of ground water and domestic wells to date have not included compounds other than TCE and PCE. The potential interaction between classes of suspect carcinogens is a matter of additional concern. The combined effects of these compounds on living systems is difficult to assess, but it is quite possible that the hepatotoxicity (liver injury) of the chlorinated aliphatics may increase or promote the liver tumorigenicity of TCE, PCBs, and other compounds. Similarly, the capacity of PCBs and other compounds to stimulate or induce liver enzyme systems which are involved in activating carcinogens into highly reactive and genotoxic metabolites may enhance the pathogenic potential of the individual compounds. Mixtures of toluene and PCE, for example, resulted in LD_{50} (that dose lethal to 50% of animals treated) values of less than that predicted for simple additivity, illustrating the possibility of synergistic effects. Information regarding complete priority pollutant analyses of groundwater and domestic wells in the vicinity would be useful in assessing the scope of pollution and thus the hazards posed to affected neighboring residents.

SECTION 3

ORIGINAL
(Red)

APPENDIX 1

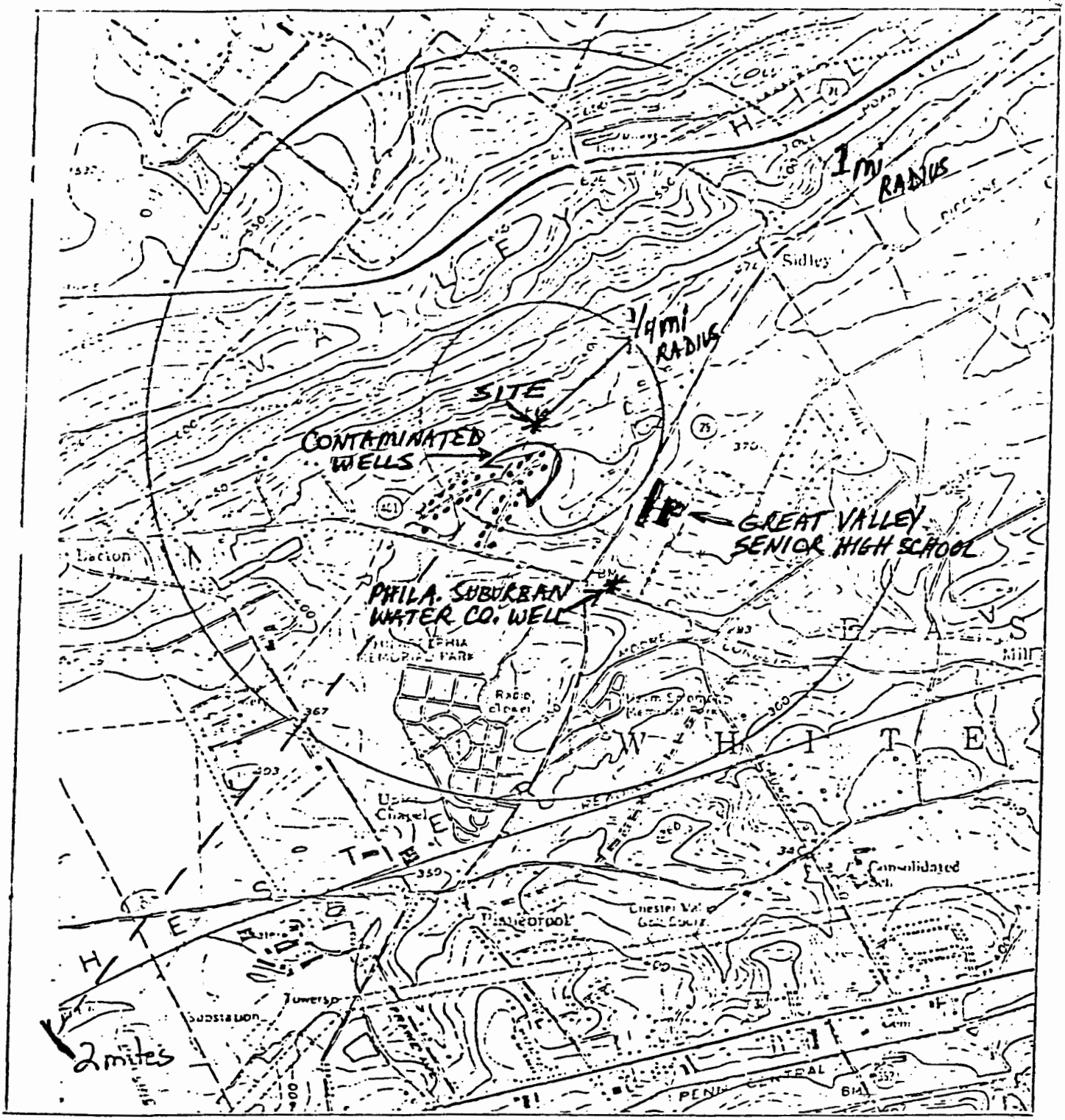
SITE NAME: CHEMCLENE

TDD NO.: F3-8203-09

EPA NO.: PA-322

TITLE: LOCATION OF DRUM DISPOSAL SITE

FIGURE NO. 3-1



SOURCE: USGS 7.5' MAP OF FLOODPRONE AREAS, MALVERN, PA.

SCALE: 1:24000

AR000070

ORIGINAL
(Red)

APPENDIX 2

3.2

SAMPLE DATA SUMMARY

Site Name: CHEMCLENE
TDI No.: F3-8203-09
EPA No.: PA-322
Date of Sample: 4/8/82

☒ ORGANIC
☐ INORGANIC

COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ppb = ug/l - L (aqueous); ppb = ug/kg - S (solid)

(For tentatively identified compounds see Analytical Data Sheets in the appendices)

Sample I.D. No. Types and Location	Element/Compound Name: METHYLENE CHLORIDE	TRICHLOROETHYLENE	1,1,1-TRICHLOROETHANE	TOLUENE	TETRACHLOROETHYLENE	ETHYLBENZENE	BENZENE	1,1,2,2-TETRACHLORO-ETHANE	Comments
Sample Blank									
Lab Blank									
Stained Soil #1	840	6500	2900	2300	2000	1100	45		
Boiled Liquid	180	1700	820	350	22000				
Stained soil #2	520	28	20	15	570	6.8			
Waxy Substance		13000		460	1300	400		360	

AR000072

SAMPLE DATA SUMMARY

Site Name: CHEMICLENE
TDI No.: F3-8203-09
EPA No.: PA-322
Date of Sampling: 4/8/82

☒ ORGANIC
☐ INORGANIC
} COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ppb = ug/l - L (aqueous); ppb = ug/kg - S (solid)

(For tentatively identified compounds see Analytical Data Sheets in the appendices)

Sample I.D. No. Types and Location	Element/Compound Name: CHLOROFORM	1,1-DICHLOROETHANE	1,1-DICHLOROETHYLENE	CARBON TETRACHLORIDE	1,1,2-TRICHLORO-ETHANE	XYLENE ISOMER	TRICHLOROBENZENE	CIS-1,2-DICHLORO-ETHYLENE	Comments
Sample Blank									
Lab Blank									
Stained soil #1		29	91			<10,000		<100	
Cooled liquid	12	62	12	14	300	<10,000		<1000	
Stained soil #2						<100	<100		
Waxy Substance					41	<10,000			

AR000073

SAMPLE DATA SUMMARY

Site Name: CHEMCLENE
TDI No.: F3-8203-09
EPA No.: PA-322
Date of Sampling: 4/8/82

☒ ORGANIC
☐ INORGANIC

COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ppb = ug/l - L (aqueous); ppb = ug/kg - S (solid)

(For tentatively identified compounds see Analytical Data Sheets in the appendixes)

Sample I.D. No. Type and Location	Element/Compound Name: 1,1,2,2-TETRACHLOROETHANE	DICHLOROETHYNE	FLUORANTHENE	PYRENE	PHENANTHRENE	ISOPHRONE	ETHYLBENZENE	NAPTHALENE	Comments
Sample Blank									
Lab Blank									
Stained soil #1			3500	2200	8200				
Pooled liquid	< 100					109	< 10		
Stained soil #2					26000			4200	
Waxy Substance	< 1000	< 100						10000	

AR000074

SAMPLE DATA SUMMARY

Site Name: CHEMCLENE
TDD No.: F3-8203-09
EPA No.: PA-322
Date of Sampling: 4/8/82

☒ ORGANIC
☐ INORGANIC

} COMPOUNDS IDENTIFIED IN SAMPLE RESULTS

Concentrations in: ppb = ug/l - L (aqueous); ppb = ug/kg - S (solid)

(For tentatively identified compounds see Analytical Data Sheets in the appendixes)

Sample I.D. No. Type and Location	Element/Compound Name: CHRYSENE	PHENOL	2,4-DIMETHYLPHENOL	BIS(2-ETHYLHEXYL) PHTHALATE	PCB 1254	PCB 1242			Comments
Sample Blank									
Lot Blank									
Stained Soil #1					1350000				
sled Liquid									
Stained Soil #2	6400					61500			
Waxy Substance		15000	5500	210000					

AR000075

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(Red)

APPENDIX 3

CHEMCLENE CORPORATION
EB-8203-09
PA-322
3.3

SAMPLES COLLECTED BY CHEMCLENE ON 5/7/81

MONITORING WELL #	PUMPING TIME BEFORE SAMPLING	1,1,1-trichloroethane (ug/l)	TCE	PCE
CC-2	10 min	12.4	57.8	7.3
	20 min	13.3	62.2	7.0
	60 min	17.0	64.1	3.0
CC-3 (adjacent to Plant)	30 min	2,080	12,600	1,120
	40 min	2,230	12,600	1,190
	60 min	1,690	10,500	885
CC-5 (in old disposal area)	5 min	586	1,180	81
	20 min	627	1,310	90
	30 min	572	1,270	73

AR000077

Chemclene
F3-8303-09.
3.3

TCE Concentrations

Well No.	Concentration	Well No.	Concentration	Well No.	Concentration
1	0.0	24	N.S.	47	0.0
2	0.0	25	0.0	48	0.0 (DER)
3	0.0	26	N.S.	49	0.0
4	0.0	27	N.S.	50	0.0
5	2.5	28	N.S.	51	.5
6	32.4	29	N.S.	52	0.0
7	0.0	30	N.S.	53	0.0
8	0.0	31	N.S.	54	0.0
9	75.6	32	N.S.	55	0.0 (DER)
10	1330.0	33	N.P.	56	14.3
11	N.S.	34	N.S.	57	11.4
12	N.S.	35	1.2	58	2.9
13	N.S.	36	2.6 (DER)	59	0.0
14	N.S.	37	N.S.	60	0.0
15	27.0	38	N.S.	61	0.0
16	8.8	39	N.S.	62	N.S.
17	15.0	40	N.S.	63	0.0
18	N.P.	41	190.5	64	0.0
19	13.3	42	0.0	65	.12
20	.3	43	0.0	66	N.P.
21	N.P.	44	.5	67	.4
22	N.P.	45	0.0	68	N.D.
23	13.0	46	0.0	69	N.D.

N.S. - not sampled, not in study area or a non-flowing spring
N.P. - no pump
DER - result obtained from DER
N.D. - not drilled at the time of sampling

Results from water samples collected from wells in the vicinity of the Chemclene Corporation, Frazer, Pennsylvania. The wells were sampled May 8 and 9, 1980, and June 13, 1980, and analyzed for TCE. All results are in micrograms/liter.

ORIGINAL

TCE Concentrations

ppb

Well No.	Concentration	Well No.	Concentration	Well No.	Concentration
1	0.0	24	N.S.	47	0.0
2	0.0	25	0.0	48	0.0 (DER)
3	0.0	26	N.S.	49	0.0
4	0.0	27	N.S.	50	0.0
5	2.5	28	N.S.	51	.5
6	32.4	29	N.S.	52	0.0
7	0.0	30	N.S.	53	0.0
8	0.0	31	N.S.	54	0.0
9	75.6	32	N.S.	55	0.0 (DER)
10	1330.0	33	N.P.	56	14.3
11	N.S.	34	N.S.	57	11.4
12	N.S.	35	1.2	58	2.9
13	N.S.	36	2.6 (DER)	59	0.0
14	N.S.	37	N.S.	60	0.0
15	27.0	38	N.S.	61	0.0
16	8.8	39	N.S.	62	N.S.
17	15.0	40	N.S.	63	0.0
18	N.P.	41	190.5	64	0.0
19	13.3	42	0.0	65	.12
20	.3	43	0.0	66	N.P.
21	N.P.	44	.5	67	.4
22	N.P.	45	0.0	68	N.D.
23	13.0	46	0.0	69	N.D.

N.S. - not sampled, not in study area or a non-flowing spring
N.P. - no pump
(DER) - result obtained from DER
- not drilled at the time of sampling

Results from water samples collected from wells in the vicinity of the Chemclene Corporation, Frazer, Pennsylvania. The wells were sampled May 8 and 9, 1980, and June 13, 1980, and analyzed for TCE. All results are in micrograms/liter.

Water samples were collected from Monitoring Wells CC-2, CC-3 and CC-5 on May 7, 1981, using a portable electric submersible pump and generator. Monitor Well CC-4 was not sampled because the water level had dropped below the bottom of the screen in the well. Monitor Well CC-1 was not sampled because the well had collapsed to a point at or above the water level in the well. If the water level rises in either of these wells, it may be possible to collect water samples from them.

A procedure for sampling these three monitoring wells was selected to minimize cross contamination from well to well. This was accomplished by pumping the least contaminated well (CC-5) first. Between the collection of each sample, the sampling equipment was thoroughly rinsed with uncontaminated water. Prior to and during sampling, water-level and flow measurements were made in each well. From this information, the relative productivity of each well was then determined. Results of these measurements appear in Appendix D.

Monitor Wells CC-2 and CC-3 were pumped for 60 minutes and sampled at 3 different times. Monitor Well CC-5 was pumped for 30 minutes and was likewise sampled 3 times. The results of the analysis performed on these samples are shown in Table 2.

Soil Samples

Because the age and nature of the problem and the thickness of contamination in the area, soil sampling would not provide meaningful results. For these reasons, the

Monitor Well	Elapsed Time in Minutes	1,1,1-Trichloroethane	TCE (ppb)	PCE
CC-2	10	12.4	57.8	7.3
	20	13.3	62.2	7.0
	60	17.0	64.1	3.0
CC-3	30	2,080.	12,600.	1,120.
	40	2,230.	12,600.	1,170.
	60	1,690.	10,500.	885.
CC-5	5	586.	1,180.	861.
	20	627.	1,310.	904.
	30	572.	1,270.	743.

oil disposal areas

Table 2 - Results of chlorinated hydrocarbon analysis of Chemclene monitoring wells, Samples collected May 7, 1981. All results micrograms per liter.

ORIGINAL
(Red)

Post Office Box 2063
Harrisburg, Pennsylvania 17120
October 26, 1984

(717) xx

In reply refer to
XX

CERTIFIED MAIL NO.

Chemclene Corporation
258 N. Phoenixville Pike
Malvern, PA 19355

Attention: Mr. Lloyd Balderston

Dear Mr. Balderston:

This letter is to respond to the "Groundwater Retrieval Plan for the Former Disposal Area" and certain other technical issues which have been raised in regard to the implementation of ongoing remedial actions at your facility. In addition, certain other matters which may not be of a strictly technical nature require clarification. These issues will be addressed first and will more clearly define the position of both the DER and EPA in this matter.

As you are aware, the Malvern TCE site has been placed on the National Priorities List of potential hazardous waste sites pursuant to Section 105(8)(B) of the Federal Comprehensive Environmental Response, Compensation and Liability Act of 1980 (42 U.S.C. §9601 et seq.) (CERCLA). Pursuant to CERCLA, the Pennsylvania Department of Environmental Resources (DER) and the United States Environmental Protection Agency (EPA) are authorized to expend public funds to investigate and take corrective actions to abate or prevent releases or threatened releases of hazardous substances, pollutants, and other contaminants at National Priorities List sites. Section 104(17) of the Pennsylvania Solid Waste Management Act, the Act of April 7, 1980, P.L. 380, 35 P.S. §6018.104(17) authorizes the Department to

ORIGINAL (Red)

receive and expend funds for such purposes.

The DER and EPA believe your firm is a responsible party (as defined in Section 107(a) of CERCLA), 42 U.S.C. §9607(a)) for the conditions existing at your facility. Section 107 of CERCLA provides that responsible parties are liable for all costs of responsible actions incurred by the DER and EPA, including investigation, planning, cleanup measures and enforcement costs.

Section 300.68(c and f) of the National Contingency Plan (40 C.F.R. Part 300) (NCP) provides for the implementation of remedial planning and remedial construction activities at Superfund sites by responsible parties. DER and EPA have been working with your firm for some time in this regard. To date, your firm has expressed a willingness to implement certain remedial actions that DER and EPA have determined appropriate. It is the Department's desire to encourage continued voluntary efforts by your firm. The remainder of this letter is an attempt to outline the course of such actions, which must be consistent with CERCLA and the NCP.

In general, CERCLA and the NCP provide that Remedial Planning Activities at Superfund sites must consist of a Remedial Investigation and Feasibility Study. The Remedial Investigation should be designed to provide any and all data necessary to define the nature and extent of the problems presented by release or threatened release from the facility (40 C.F.R. Part 300.68(f)). It is the belief of the DER and EPA that your firm has already collected a large portion of the data necessary to constitute an acceptable Remedial Investigation. However, certain data is still required and other data needs further clarification. Many of these required items are addressed in the technical comments below. It

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is hoped that all data collected will eventually be compiled into a single Remedial Investigation Report which will serve as a data base from which a Feasibility Study can be performed. In this case, the Remedial Investigation Report make consist of a presentation of existing data (in its existing form) with explanatory discussions sufficient to describe the relationships and significance thereof.

The Feasibility Study should meet the requirements of Section 300.68(f) through Section 300.68(j) of the NCP. The purpose of the Feasibility Study is to develop and evaluate remedial action alternatives based on results obtained from the Remedial Investigation. A list of potential alternatives is compiled and evaluated against criteria which addresses technical, environmental, and economic factors. Again, it is thought that your firm may have already completed a portion of the data base analysis necessary to complete a Feasibility Study. It is expected that upon completion and acceptance by the DER and EPA of a Remedial Investigation Report, your firm will complete a Feasibility Study.

The Department offers the following technical comments and recommendations on specific proposals submitted by your firm and by your consultants, Earth Data, Inc.

I. <u>"Open" and "Closed" pit areas</u>

A. With reference to the second set of soil samples taken on August 3, 1984, it appears that while the concentrations of volatile organics in the soil are significant, no conclusive trends (i.e., a marked increase or decrease with depth) exist beneath

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the pits. Also, one can assume that the soils and unconsolidated material beneath the pits will exhibit a relatively uniform concentration of volatile organics which extends to the water table. In addition to the above-referenced soil analyses, this conclusion is supported by the length of time available for contaminant migration beneath the pit, the mobile behavior of volatile organics in the subsurface environment, and the levels of said contaminants already detected in the grouundwater system through the periodic monitoring of wells in the area.

Based on these conclusions, the DER and EPA believe that following the completion of drum/interstitial soil removal in the "closed" pit, additional testing and extensive excavation of soil in the pits is not warranted. Rather, the DER and EPA feel the major emphasis in the remedial program must be on a properly designed groundwater recovery and treatment system which proves to be an effective, long-term method of reducing pollutants to acceptable levels. Our comments and recommendations on such a system are presented in the next section.

B. I understand that the excavation of the "open" pit is complete and that the removal of drums and soil from the "closed" pit is proceeding ahead of schedule. Upon completion of the drum/interstitial soil removal for the "closed" pit, the pit should be inspected for any areas of obviously discolored (highly contaminated) soils from the sides and bottom. These soils must

also be removed (this procedure was also followed for the "open" pit). Both pits should then be backfilled with clean soil and properly graded. In addition, the Department should be notified prior to the backfilling operation in the event of final inspection of the pit areas is warranted. Details of the entire operation should be submitted to the Department in the form of a Closure Plan.

II. Proposed Recovery/Monitoring Well System

A. It has been previously documented that the predominant direction of groundwater flow is to the east-northeast towards the Glascow and Cedar Hollow quarries, which both pump considerable quantities of groundwater on a continuous basis. It was also indicated (from conversations with your consultant, Earth Data, Inc.) that seasonal fluctuations in the groundwater system produce a secondary, albeit less significant, component of flow to the south towards Valley Creek. In order to contain the migration of contaminants to the south, and to successfully capture the contaminant plume under the spray irrigation area, we recommend that an additional recovery well be drilled. Well CC5 could be converted to a recovery well and the proposed recovery Well CC6 should be relocated approximately 100-150 feet northeast from its original position. In any case, long-term pumping tests must be conducted to accurately determine the effectiveness of recovery well placement(s) and specific discharge rates necessary to produce and maintain a

cone of depression which will encompass both the disposal pit and spray irrigation areas. Water table elevation measurements must be taken before, during, and after these tests to help determine the limits of this zone of influence. Existing adjacent residential wells should also be utilized as measuring points.

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B. The general locations proposed for monitoring Well CC7, CC8 and CC9 are acceptable. However, if Well CC5 is "converted" into a recovery well, provisions should be made for periodic monitoring of a well located to the south towards Valley Creek. This may involve drilling a new monitoring well, or if this is not feasible, monitoring an existing residential well in the area.

C. Well casings should be made of steel rather than thermoplastic casing due to the elevated concentrations of chlorinated organic compounds present in groundwater. This will eliminate leaching of any undesirable constituents from thermoplastic materials and will promote more representative groundwater analyses.

D. Design and construction details of all recovery and monitoring wells must be provided to the Department.

E. To properly delineate the extent of the existing contaminant plume and to monitor any effects that the groundwater recovery/treatment operation may have on areas downgradient from the disposal and plant sites, it is highly recommended that provisions be made to install a monitoring well, or utilize an

existing well, located downgradient (i.e., east-northeast) from Chemclene between the plant and the quarries. The location of this well can be discussed with the DER and EPA.

F. In conjunction with the monitoring program, new groundwater contour and contaminant isocon maps must be developed. Initially, a "background" map should be prepared which depicts recent pre-pumping conditions. As groundwater recovery progresses, these maps should be periodically updated to accurately reflect the influence of the recovery system and effectiveness of the treatment method.

III. Spray Irrigation System

A. Although the DER and EPA are not opposed to the concept of a spray irrigation system as a method of reducing volatiles in groundwater, the effectiveness of such a system as a continuously operating, long-term remedial method has not been established. Ultimately, the DER and EPA feel that a treatment system must be developed which can function throughout the year, is not affected by freezing conditions or soil loading limitations, and will maintain a constant cone of depression under the spray area. Both an air-stripping tower and air-lift techniques are possible alternatives and must be investigated.

B. Until more conclusive data can be generated, however, the proposed spray irrigation system may be operated on a six (6)

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month trial basis, after which time a performance evaluation of the system will be conducted. Prior to and during the spray irrigation program, however, additional data and information must be submitted to the Department. This is detailed below:

1. A more extensive soil analysis needs to be conducted. The degree of biodegradation, buildup and migration of volatile organic compounds in the soil medium needs to be addressed. Also of concern is the immediate and long-term effects on plantlife. It is expected that at least partial answers to these concerns can be provided at the end of the 6-month trial program for the spray system.

2. A soil testing program within the designated spray area must be developed which includes provisions for soil sampling prior to, during, and upon completion of the spray irrigation. Sampling should be conducted at predetermined locations at various depths to fully characterize the on-site soils prior to spraying. Data on soil types, textures, consistencies, profiles, hydraulic properties, etc. will aid in the determination of applicable loading rates.

3. Supporting documentation must be provided which can rationalize the determination that two to four acres is sufficient for a proposed application rate of 50 to 100 inches per year.

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4. An additional monitoring well should be installed, either within or on the downgradient "edge" of the spray irrigation area in order to assess the changes in groundwater quality over the life of the project. The design should be consistent with that of the other proposed wells. In addition, drawdown effects could be measured in this well which will help delineate the cone of depression formed from the recovery well(s).

5. A specific delineation of the proposed spray irrigation area should be included on a site map.

C. The potential for off-site migration of organic vapors to adjoining residential areas must be investigated. The direction of any vapors will primarily be controlled by the prevailing wind direction. Human health effects as a direct result of exposure to vapors is a matter of concern. During the initial stages of the program, air monitoring devices could be stationed at specific off-site locations to monitor vapor concentrations under varying climatic conditions. The concept and establishment of an air monitoring program should be investigated, and we suggest that you contact Bureau of Air Quality Control, 1875 New Hope Street, Norristown, PA 19401, Telephone (215) 270-1900, for further information and any approvals which may be required.

D. Pending the submittal of this additional information to the Department, the spray irrigation system may be allowed to

ORIGINAL (Red)

operate on a six-month trial basis. Performance data (soil/water analyses) should be submitted as frequently as possible in order to facilitate proper assessment of the system.

E. It must be noted that even if the data collected over the trial period indicate the system is functioning as intended, the concept of long-term spraying may not be acceptable. A more viable solution, as previously mentioned, would be a permanent air-stripping tower with discharge of effluent to stormwater swales or ditches. (Note that this discharge must be approved by the Bureau of Water Quality Management. The Bureau will also determine the effluent limits).

F. After two or three months of spray irrigation, a more comprehensive assessment of other alternatives to spray irrigation must be developed. This will constitute an important part of the Feasibility Study described earlier in this letter. The assessment should be completed prior to termination of the spray irrigation trial period. Adequate time must be allotted for the development and implementation of such an alternate system, should it be proven necessary.

I wish to emphasize the Department's desire to continue working with you in bringing about the ultimate cleanup of this site. We are pleased that you have responded in a cooperative and positive manner to date. Both the DER and EPA stand ready to meet with you or your representatives at any time to discuss the technical details of this response or general issues concerning which you may

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(Red)

have questions. In this regard, please feel free to contact me at the telephone and address listed above. Any questions or comments to the EPA should be directed to Mark DeFeliciantonio at (215) 597-8185.

Sincerely,

Eugene W. Pine, Hydrogeologist
Emergency and Remedial Response Section
Division of Operations
Bureau of Solid Waste Management

cc: Attorney Embick
Mr. DeFeliciantonio
Ms. Luborsky
Ms. Shup
Mr. Rotstein
Mr. Beitler
Mr. Pine
Mr. Steiner
File
Chron.

EP:rd

CHEMCLENE CORPORATION
GUIDANCE

METHYLENE CHLORIDE

Summary

Methylene chloride increased the incidence of lung and liver tumors and sarcomas in rats and mice. It was found to be mutagenic in bacterial test systems. In humans, methylene chloride irritates the eyes, mucous membranes, and skin. Exposure to high levels adversely affects the central and peripheral nervous systems and the heart. In experimental animals, methylene chloride is reported to cause kidney and liver damage, convulsions, and paresis.

CAS Number: 75-09-2

Chemical Formula: CH_2Cl_2

IUPAC Name: Dichloromethane

Important Synonyms and Trade Names: Methylene dichloride, methane dichloride

Chemical and Physical Properties

Molecular Weight: 84.93

Boiling Point: 40°C

Melting Point: -95.1°C

Specific Gravity: 1.3266 at 20°C

Solubility in Water: 13,200-20,000 mg/liter at 25°C

Solubility in Organics: Miscible with alcohol and ether

Log Octanol/Water Partition Coefficient: 1.25

Vapor Pressure: 362.4 mm Hg at 20°C

Vapor Density: 2.93

Transport and Fate

Volatilization to the atmosphere appears to be the major mechanism for removal of methylene chloride from aquatic systems

and its primary environmental transport process (USEPA 1979). Photooxidation in the troposphere appears to be the dominant environmental fate of methylene chloride. Once in the troposphere, the compound is attacked by hydroxyl radicals, resulting in the formation of carbon dioxide, and to a lesser extent, carbon monoxide and phosgene. Phosgene is readily hydrolyzed to HCl and CO_2. About one percent of tropospheric methylene chloride would be expected to reach the stratosphere where it would probably undergo photodissociation resulting from interaction with high energy ultraviolet radiation. Aerial transport of methylene chloride is partly responsible for its relatively wide environmental distribution. Atmospheric methylene chloride may be returned to the earth in precipitation.

Photolysis, oxidation, and hydrolysis do not appear to be significant environmental fate processes for methylene chloride, and there is no evidence to suggest that either adsorption or bioaccumulation are important fate processes for this chemical. Although methylene chloride is potentially biodegradable, especially by acclimatized microorganisms, biodegradation probably only occurs at a very slow rate.

Health Effects

Methylene chloride is currently under review by the National Toxicology Program (NTP 1984, USEPA 1985). Preliminary results indicate that it produced an increased incidence of lung and liver tumors in mice and mammary tumors in female and male rats. In a chronic inhalation study, male rats exhibited an increased incidence of sarcomas in the ventral neck region (Burek et al. 1984). However, the authors suggested that the relevance and toxicological significance of this finding were uncertain in light of available toxicity data. Methylene chloride is reported to be mutagenic in bacterial test systems. It also has produced positive results in the Fischer rat embryo cell transformation test. However, it has been suggested that the observed cell-transforming capability may have been due to impurities in the test material. There is no conclusive evidence that methylene chloride can produce teratogenic effects.

In humans, direct contact with methylene chloride produces eye, respiratory passage, and skin irritation (USEPA 1985). Mild poisonings due to inhalation exposure produce somnolence, lassitude, numbness and tingling of the limbs, anorexia, and lightheadedness, followed by rapid and complete recovery. More severe poisonings generally involve correspondingly greater disturbances of the central and peripheral nervous systems. Methylene chloride also has acute toxic effects on the heart, including the induction of arrhythmia. Fatalities reportedly

due to methylene chloride exposure have been attributed to cardiac injury and heart failure. Methylene chloride is metabolized to carbon monoxide in vivo, and levels of carboxyhemoglobin in the blood are elevated after acute exposures. In experimental animals, methylene chloride is reported to cause kidney and liver damage, convulsions, and distal paresis. An oral LD_{50} value of 2,136 mg/kg, and an inhalation LC_{50} value of 88,000 mg/m^3/30 min are reported for the rat.

Toxicity to Wildlife and Domestic Animals

Very little information concerning the toxicity of methylene chloride to domestic animals and wildlife exists (USEPA 1980). Acute values for the freshwater species Daphnia magna, the fathead minnow, and the bluegill are 224,000, 193,000, and 224,000 µg/liter, respectively. Acute values for the saltwater species, mysid shrimp and sheepshead minnow, are 256,000 and 331,000 µg/liter, respectively. No data concerning chronic toxicity are available. The 96-hour EC_{50} values for both freshwater and saltwater algae are greater than the highest test concentration, 662,000 µg/liter.

Regulations and Standards

Ambient Water Quality Criteria (USEPA):

Aquatic Life

The available data are not adequate for establishing criteria.

Human Health

Criterion: 12.4 mg/liter (for protection against the noncarcinogenic effects of methylene chloride)

CAG Unit Risk (USEPA): 1.4×10^{-2} $(mg/kg/day)^{-1}$

NIOSH Recommended Standards:

261 mg/m^3 TWA in the presence of no more than 9.9 mg/m^3 of CO
1,737 mg/m^3/15 min Peak Concentration

OSHA Standards: 1,737 mg/m^3 TWA
3,474 mg/m^3 Ceiling Level
6,948 mg/m^3 Peak Concentration (5 min in any 3 hr)

ACGIH Threshold Limit Values: 350 mg/m^3 TWA
1,740 mg/m^3 STEL

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TETRACHLOROETHYLENE

Summary

Tetrachloroethylene (PCE, perchloroethylene) induced liver tumors when administered orally to mice and was found to be mutagenic using a microbial assay system. Reproduction toxicity was observed in pregnant rats and mice exposed to high concentrations. Animals exposed by inhalation to tetrachloroethylene exhibited liver, kidney, and central nervous system damage.

CAS Number: 127-18-4

Chemical Formula: C_2Cl_4

IUPAC Name: Tetrachloroethene

Important Synonyms and Trade Names: Perchloroethylene, PCE

Chemical and Physical Properties

Molecular Weight: 165.83

Boiling Point: 121°C

Melting Point: -22.7°C

Specific Gravity: 1.63

Solubility in Water: 150 to 200 mg/liter at 20°C

Solubility in Organics: Soluble in alcohol, ether, and benzene

Log Octanol/Water Partition Coefficient: 2.88

Vapor Pressure: 14 mm Hg at 20°C

Transport and Fate

Tetrachloroethylene (PCE) rapidly volatiziles into the atmosphere where it reacts with hydroxyl radicals to produce HCl, CO, CO_2 and carboxylic acid. This is probably the most important transport and fate process for tetrachloroethylene in the environment. PCE will leach into the groundwater, especially in soils of low organic content. In soils with high levels of organics, PCE adsorbs to these materials and can

be bioaccumulated to some degree. However, it is unclear if tetrachloroethylene bound to organic material can be degraded by microorganisms or must be desorbed to be destroyed. There is some evidence that higher organisms can metabolize PCE.

Health Effects

Tetrachloroethylene was found to produce liver cancer in male and female mice when administered orally by gavage (NCI 1977). Unpublished gavage studies in rats and mice performed by the National Toxicology Program (NTP) showed hepatocellular carcinomas in mice and a slight, statistically insignificant increase in a rare type of kidney tumor.[1] NTP is also conducting an inhalation carcinogenicity study. Elevated mutagenic activity was found in Salmonella strains treated with tetrachloroethylene. Delayed ossification of skull bones and sternebrae were reported in offspring of pregnant mice exposed to 2,000 mg/m^3 of tetrachloroethylene for 7 hours/day on days 6-15 of gestation. Increased fetal resorptions were observed after exposure of pregnant rats to tetrachloroethylene. Renal toxicity and hepatotoxicity have been noted following chronic inhalation exposure of rats to tetrachloroethylene levels of 1,356 mg/m^3. During the first 2 weeks of a subchronic inhalation study, exposure to concentrations of 1,622 ppm (10,867 mg/m^3) of tetrachloroethylene produced signs of central nervous system depression, and cholinergic stimulation was observed among rabbits, monkeys, rats, and guinea pigs.

Toxicity to Wildlife and Domestic Animals

Tetrachloroethylene is the most toxic of the chloroethylenes to aquatic organisms but is only moderately toxic relative to other types of compounds. The limited acute toxicity data indicate that the LC_{50} value for saltwater and freshwater species are similar, around 10,000 µg/liter; the trout was the most sensitive (LC_{50} = 4,800 µg/liter). Chronic values were 840 and 450 µg/liter for freshwater and saltwater species, respectively, and an acute-chronic ratio of 19 was calculated.

No information on the toxicity of tetrachloroethylene to terrestrial wildlife or domestic animals was available in the literature reviewed.

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[1] J. Mennear, NTP Chemical Manager; personal communication, 1984.

Regulations and Standards

Ambient Water Quality Criteria (USEPA):

Aquatic Life

The available data are not adequate for establishing criteria. However, EPA did report the lowest values known to be toxic to aquatic organisms.

Freshwater

Acute toxicity: 5,280 µg/liter
Chronic toxicity: 840 µg/liter

Saltwater

Acute toxicity: 10,200 µg/liter
Chronic toxicity: 450 µg/liter

Human Health

Estimates of the carcinogenic risks associated with lifetime exposure to various concentrations of tetrachloroethylene in water are:

Risk	Concentration
10^{-5}	8.0 µg/liter
10^{-6}	0.8 µg/liter
10^{-7}	0.08 µg/liter

CAG Unit Risk (USEPA): 5.1×10^{-2} $(mg/kg/day)^{-1}$

NIOSH Recommended Standards (air): 335 mg/m^3 TWA
670 mg/m^3 15-min Ceiling Level

OSHA Standards (air): 670 mg/m^3 TWA
1,340 mg/m^3 Ceiling Level
2,010 mg/m^3 for 5 min every 3 hr, Peak Level

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1,1,1-TRICHLOROETHANE

Summary

Preliminary results suggest that 1,1,1-trichloroethane (1,1,1-TCA) induces liver tumors in female mice. It was shown to be mutagenic using the Ames assay, and it causes transformation in cultured rat embryo cells. Inhalation exposure to high concentrations of 1,1,1-TCA depressed the central nervous system; affected cardiovascular function; and damaged the lungs, liver, and kidneys in animals and humans. Irritation of the skin and mucous membranes has also been associated with human exposure to 1,1,1-trichloroethane.

CAS Number: 71-55-6

Chemical Formula: CH_3CCl_3

IUPAC Name: 1,1,1-Trichloroethane

Important Synonyms and Trade Names: Methyl chloroform, chlorothene, 1,1,1-TCA

Chemical and Physical Properties

Molecular Weight: 133.4

Boiling Point: 74.1°C

Melting Point: -30.4°C

Specific Gravity: 1.34 at 20°C (liquid)

Solubility in Water: 480-4,400 mg/liter at 20°C (several divergent values were reported in the literature)

Solubility in Organics: Soluble in acetone, benzene, carbon tetrachloride, methanol, ether, alcohol, and chlorinated solvents

Log Octanol/Water Partition Coefficient: 2.17

Vapor Pressure: 123 mm Hg at 20°C

Vapor Density: 4.63

Transport and Fate

1,1,1-Trichloroethane (1,1,1-TCA) disperses from surface water primarily by volatilization. Several studies have indicated that 1,1,1-trichloroethane may be adsorbed onto organic materials in the sediment, but this is probably not an important route of elimination from surface water. 1,1,1-Trichloroethane can be transported in the groundwater, but the speed of transport depends on the composition of the soil.

Photooxidation by reaction with hydroxyl radicals in the atmosphere is probably the principal fate process for this chemical.

Health Effects

1,1,1-Trichloroethane was retested for carcinogenicity because in a previous study by NCI (1977), early lethality precluded assessment of carcinogenicity. Preliminary results indicate that 1,1,1-TCA increased the incidence of combined hepatocellular carcinomas and adenomas in female mice when administered by gavage (NTP 1984). There is evidence that 1,1,1-trichloroethane is mutagenic in Salmonella typhimurium and causes transformation in cultured rat embryo cells (USEPA 1980). These data suggest that the chemical may be carcinogenic.

Other toxic effects of 1,1,1-TCA are seen only at concentrations well above those likely in an open environment. The most notable toxic effects of 1,1,1-trichloroethane in humans and animals are central nervous system depression, including anesthesia at very high concentrations and impairment of coordination, equilibrium, and judgment at lower concentrations (350 ppm and above); cardiovascular effects, including premature ventricular contractions, decreased blood pressure, and sensitization to epinephrine-induced arrhythmia; and adverse effects on the lungs, liver, and kidneys. Irritation of the skin and mucous membranes resulting from exposure to 1,1,1-trichloroethane has also been reported. The oral LD_{50} value of 1,1,1-trichloroethane in rats is about 11,000 mg/kg.

Toxicity to Wildlife and Domestic Animals

The acute toxicity of 1,1,1-trichloroethane to aquatic species is rather low, with the LC_{50} concentration for the most sensitive species tested being 52.8 mg/l. No chronic toxicity studies have been done on 1,1,1-trichloroethane, but acute-chronic ratios for the other chlorinated ethanes ranged from 2.8 to 8.7. 1,1,1-Tricholoroethane was only slighty bioaccumulated with a steady-state bioconcentration factor of nine and an elimination half-life of two days.

No information on the toxicity of 1,1,1-trichloroethane to terrestrial wildlife or domestic animals was available in the literature reviewed.

Regulations and Standards

Ambient Water Quality Criteria (USEPA):

Aquatic Life

The available data are not adequate for establishing criteria. However, EPA did report, the lowest values of the two trichloroethanes (1,1,1 and 1,1,2) known to be toxic in aquatic organisms.

Freshwater

Acute toxicity: 18 mg/liter
Chronic toxicity: 8.4 mg/liter

Saltwater

Acute toxicity: 31.2 mg/liter
Chronic toxicity: No available data

Human Health

Criterion: 18.4 mg/liter

NIOSH Recommended Standard: 350 ppm (1,910 mg/m^3)/15 min Ceiling Level

OSHA Standard: 350 ppm (1,910 mg/m^3) TWA

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TRICHLOROETHYLENE

Summary

Trichloroethylene (TCE) induced hepatocellular carcinomas in mice and was mutagenic when tested using several microbial assay systems. Chronic inhalation exposure to high concentrations caused liver, kidney, and neural damage and dermatological reactions in animals.

CAS Number: 79-01-6

Chemical Formula: C_2HCl_3

IUPAC Name: Trichloroethene

Important Synonyms and Trade Names: Trichloroethene, TCE, and ethylene trichloride

Chemical and Physical Properties

Molecular Weight: 131.5

Boiling Point: 87°C

Melting Point: -73°C

Specific Gravity: 1.4642 at 20°C

Solubility in Water: 1,000 mg/liter

Solubility in Organics: Soluble in alcohol, ether, acetone, and chloroform

Log Octanol/Water Partition Coefficient: 2.29

Vapor Pressure: 60 mm Hg at 20°C

Vapor Density: 4.53

Transport and Fate

Trichloroethylene (TCE) rapidly volatilizes into the atmosphere where it reacts with hydroxyl radicals to produce hydrochloric acid, carbon monoxide, carbon dioxide, and carboxylic acid. This is probably the most important transport and fate process for trichloroethylene in surface water and in the upper

layer of soil. TCE adsorbs to organic materials and can be bioaccumulated to some degree. However, it is unclear whether trichloroethylene bound to organic material can be degraded by microorganisms or must be desorbed to be destroyed. There is some evidence that higher organisms can metabolize TCE. Trichloroethylene leaches into the groundwater fairly readily, and it is a common contaminant of groundwater around hazardous waste sites.

Health Effects

Trichloroethylene is carcinogenic to mice after oral administration, producing hepatocellular carcinomas (NCI 1976, NTP 1982). It was found to be mutagenic using several microbial assay systems. Trichloroethylene does not appear to cause reproductive toxicity or teratogenicity. TCE has been shown to cause renal toxicity, hepatotoxicity, neurotoxicity, and dermatological reactions in animals following chronic exposure to levels greater than 2,000 mg/m^3 for 6 months. Trichloroethylene has low acute toxicity; the acute oral LD_{50} value in several species ranged from 6,000 to 7,000 mg/kg.

Toxicity to Wildlife and Domestic Animals

There was only limited data on the toxicity of trichloroethylene to aquatic organisms. The acute toxicity to freshwater species was similar in the three species tested, with LC_{50} values of about 50 mg/liter. No LC_{50} values were available for saltwater species. However, a dose of 2 mg/liter caused erratic swimming and loss of equilibrium in the grass shrimp. No chronic toxicity tests were reported.

No information on the toxicity of trichloroethylene to domestic animals or terrestrial wildlife was available in the literature reviewed.

Regulations and Standards

Ambient Water Quality Criteria (USEPA):

Aquatic Toxicity

The available data are not adequate for establishing criteria. However, EPA did report the lowest values known to be toxic in aquatic organisms.

Freshwater

Acute toxicity: 45 mg/liter
Chronic toxicity: No available data

Saltwater

Acute toxicity: 2 mg/liter
Chronic toxicity: No available data

Human Health

Estimates of the carcinogenic risks associated with lifetime exposure to various concentrations of trichloroethylene in water are:

Risk	Concentration
10^{-5}	27 µg/liter
10^{-6}	2.7 µg/liter
10^{-7}	0.27 µg/liter

CAG Unit Risk (USEPA): 1.1×10^{-2} $(mg/kg/day)^{-1}$

NIOSH Recommended Standards (air): 540 mg/m^3 TWA
760 mg/m^3 10-min Ceiling Level

OSHA Standards (air): 540 mg/m^3 TWA
1,075 mg/m^3/15-min Ceiling Level
1,620 mg/m^3 for 5 min every 3 hr, Peak Concentration

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